United States Department of the Interior

FISH AND WILDLIFE SERVICE
Florida Ecological Services Field Office

June 1, 2021

Memorandum

To: Mr. Pedro Ramos, Superintendent, Everglades National Park

DONALD PROGULSKE Digitally signed by DONALD PROGULSKE
Date: 2021.06.03 08:23:25 -04'00'

From: Donald Progulske, Everglades Program Supervisor, Florida Ecological Services Office

Subject: Biological Opinion for the Everglades National Park Vegetation Maintenance at Developed Areas and Facilities in Everglades National Park: Service Consultation Code: 04EF2000-2021-F-0216

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (Service) in accordance with section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.), as amended, for proposed vegetation maintenance at developed areas and facilities (Project) in Everglades National Park (ENP), located in Miami-Dade, Monroe, and Collier counties, Florida. This document transmits the Service's Biological Opinion (BO) based on our review of the proposed action and its effects on federally listed species and critical habitats.

The National Park Service (NPS) submitted a biological assessment (BA) that included a detailed analysis of the impacts of the action on federally threatened and endangered species to the Service on December 18, 2020. With the submission of the BA, the NPS requested initiation of formal section 7 consultation on the mowing and vegetation maintenance program on developed areas within ENP for the next 20 years to address the anticipated adverse impacts that these activities may have on several listed species over this 20 year period.

The NPS determined that the proposed action "may affect, and is likely to adversely affect" the federally endangered Bartram's scrub-hairstreak butterfly (*Strymon acis bartrami*), Florida leafwing butterfly (*Anaea troglodyte floridalis*), and the federally threatened American crocodile (*Crocodylus acutus*), Eastern black rail (*Laterallus jamaicensis jamaicensis*), Eastern indigo snake (*Drymarchon corais couperi*), Everglades bully (*Sideroxylon reclinatum*), Florida pineland crabgrass (*Digitaria pauciflora*), and Florida prairie-clover (*Dalea carthagenesis var. floridana*).

After reviewing the BA, the Service recommended reconsidering the effects determinations for the Bartram's scrub-hairstreak butterfly, the Florida leafwing butterfly, the Eastern black rail, the American crocodile, and the Eastern indigo snake to "may affect, but is not likely to adversely

affect". With the exception of the American crocodile, the NPS agreed that "may affect, but is not likely to adversely affect" is an appropriate effects determination for these species and critical habitats.

Additionally, the NPS determined that the proposed action "may affect, but is not likely to adversely affect" the following federally endangered species and critical habitats: Florida bonneted bat (*Eumops floridanus*) and its proposed critical habitat; Florida panther (*Puma concolor coryi*); Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) (CSSS) and its designated critical habitat; Bartram's scrub hairstreak butterfly critical habitat, Florida leafwing butterfly critical habitat, Cape Sable thoroughwort (*Chromolaena frustrata*) designated critical habitat; Florida bristle fern (*Trichomanes punctatum ssp. Floridanum*) proposed critical habitat. The NPS also made the same effects determination for the following federally threatened species and critical habitats: American crocodile designated critical habitat, Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and its designated critical habitat; piping plover (*Charadrius melodus*); red knot (*Calidris canutus rufa*); and wood stork (*Mycteria americana).* Additionally, the NPS made the same effects determination for the gopher tortoise (*Gopherus polyphemus*), which is a candidate species. The Service concurs with the "may affect, but is not likely to adversely affect" determinations made by the NPS in regard to these species and critical habitats. Our rationale for concurring with these determinations and our conference concurrence for proposed Florida bonneted bat critical habitat and proposed Florida bristle fern critical habitat can be found in Appendix A of the attached BO.

Based on the analysis in this BO, the Service's conclusion is that implementation of the proposed action is not likely to jeopardize the continued existence of the American crocodile, Everglade bully, Florida pineland crabgrass, and Florida prairie-clover.

This BO is based on information provided in the BA and other sources of information. This BO was completed pursuant to Service policy on *Streamlined Consultation Guidance for Restoration/Recovery Projects* (January 2016) and associated documents. A complete administrative record of this consultation is on file at the Service's Florida Ecological Services Field Office, Vero Beach, Florida.

Thank you for your cooperation in the effort to protect fish and wildlife resources. If you have any questions regarding this project, please contact myself, Bob Progulske at 772-469-4299 or James Gruhala of my staff at 772-469-4250 or by email at james_gruhala@fws.gov.

Enclosure

cc: electronic only (w/enclosure)

ENP, Homestead, Florida (Tylan Dean)

Consultation history

- On December 18, 2020, the Service received a BA with a detailed analysis of the impacts of vegetation maintenance at developed areas and facilities in ENP that included a request to initiate formal consultation in accordance with section 7 of the ESA.
- On January 27, 2021, the Service requested for ENP to consider changing the effects determinations for the Eastern black rail, American crocodile, Eastern indigo snake, Bartram's scrub-hairstreak and its critical habitat, and the Florida leafwing and its critical habitat.
- On February 25, 2021, ENP responded to the Service's request, and agreed that "may affect, but is not likely to adversely affect" is an appropriate effects determination for the Eastern black rail, Eastern indigo snake, Bartram's scrub-hairstreak and its critical habitat, and the Florida leafwing and its critical habitat.
- On March 4, 2021, the Service requested any point data showing the estimated number of crocodile nests that have been found near the 12 project features that are along Main Park Road in the Flamingo District from ENP.
- On March 5, 2021, ENP responded to the Service's request with additional crocodile data near the 12 project features that are along Main Park Road in the Flamingo District.
- On March 16, 2021, the Service requested additional information regarding mowing activities and crocodile nests within the Action Area.
- On March 17, 2021, ENP responded to the Service's request with additional information regarding mowing activities and crocodile nests within the Action Area.
- On April 6, 2021, the Service submitted a draft BO to ENP for review.
- On April 22, 2021, ENP responded with comments for the draft BO.
- On April 27, 2021, the Service submitted an updated version of the draft BO to ENP for review.
- On April 30, 2021, ENP responded with comments for the draft BO.
- On May 5, 2021, the Service submitted an updated version of the draft BO to ENP for review.
- On May 6, 2021, ENP responded with an approval of the updated version of the draft BO.

A complete administrative record of this consultation is on file at the Service's Florida Ecological Services Field Office, Vero Beach, Florida.

BIOLOGICAL OPINION

Introdution

This BO provides the Service's opinion as to whether the proposed Project is likely to jeopardize the continued existence of the American crocodile (*Crocodylus acutus*), Everglades bully (*Sideroxylon reclinatum*), Florida pineland crabgrass (*Digitaria pauciflora*), and Florida prairie-clover (*Dalea carthagenesis var. floridana*).

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy determination

Section 7(a)(2) of the ESA requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. A BO is a document that states the opinion of the Service as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. "*Jeopardize the continued existence of*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this BO relies on four components: (1) the Status of the Species, which describes the range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the species in the Action Area, the factors responsible for that condition, and the relationship of the Action Area to the survival and recovery of the species; (3) the Effects of the Action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the Cumulative Effects, which evaluate the effects of future, non-federal activities in the Action Area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

Adverse modification determination

Section 7(a)(2) of the ESA requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of the critical habitat of listed species.

"*Destruction or adverse modification*" is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations

may include, but are not limited to, those that alter the physical and biological features (PBFs) that are essential to the conservation of a species or that preclude or significantly delay development of such elements (50 CFR § 402.02; 81 FR 7214-7226). The destruction or adverse modification definition focuses on how Federal actions affect the quantity and quality of the physical or biological features in the designated critical habitat for a listed species and, especially in the case of unoccupied habitat, on any impacts to the critical habitat itself. The Service will generally conclude that a Federal action is likely to "destroy or adversely modify" designated critical habitat if the action results in an alteration of the quantity or quality of the essential PBFs of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of the species. The Service may also consider other kinds of impacts to designated critical habitat as appropriate.

DESCRIPTION OF THE PROPOSED ACTION

The purpose of the proposed action is to continue maintenance of developed areas and facilities within ENP, including roadside vegetation management, vista clearing and hazardous tree management. The proposed action is intended to preserve ENP's aesthetic appearance for visitor enjoyment, provides safe vehicular pull off access, assists in fire control and prevention and provides visitor safety throughout ENP. These activities will be conducted under the mowing and vegetation maintenance program on developed areas within ENP for the next 20 years (until 2041).

The NPS staff is currently responsible for and has been routinely maintaining the majority of these areas for decades. However, vegetation maintenance on some of these areas is proposed to be or has been contracted out to private vendor(s), and several sites are currently maintained by concessionaire staff within ENP. The maintenance activities considered in this BO include routine vegetation management, hazard tree management, and vista management. The majority of these activities will occur within currently mowed and maintained areas throughout ENP; although some areas that have been previously disturbed/developed, which are not included in ENP's current maintenance regime, have also been included as part of the proposed action in case the ENP determines that maintenance of these areas will be reinitiated.

Routine Vegetation Management

Routine vegetation maintenance and landscaping activities within developed areas, facilities and paved roads/paths include mowing, weed eating, edging, air blowing, and shrub/tree line trimming conducted manually or using a tractor mounted tree trimmer. The majority of roadside mowing is accomplished using a flex-wing rotary cutter tractor mounted mower. For more spatially restrictive areas and areas where low ground pressure is needed to prevent rutting, mowing is typically accomplished using zero-turn type mowers. String trimming is carried out throughout the developed areas primarily around signs and other markers, walkways or other features that cannot be reached with tractor mounted or zero-turn type mowers. Edging is used to prevent vegetation growth over pavement and concrete and is conducted along sidewalks, walkways, parking areas and similar features. Air blowing is carried out along walkways, parking areas, pullouts and other impervious surfaces. String trimming, edging and air blowing

are carried out with gas powered equipment. Vegetation along sidewalks and fence lines, around signs and the foundations of buildings and in other locations where mechanical control is not sufficient or implementable may be treated with appropriate and NPS approved herbicides. Herbicides typically used would include products containing the active ingredients glyphosate or triclopyr. All herbicides used for vegetation management require internal review and approval prior to being applied.

Culverts underneath roads and paved areas exist throughout ENP for the purpose of maintain hydrological connectivity where roads impede water flow. The culverts and adjacent vegetation require periodic maintenance to ensure these connections are kept clear of any impediments and function properly. Woody and herbaceous vegetation around the entrance/exits of these culverts is cleared as needed with gas powered string trimmers or a tractor mounted mower during the dry season when standing water is not present. The maintained area will not exceed 15' of the culvert opening.

The tree line along the edge (mow-line) of many mowed areas and fence lines (such as roadside and parking lot areas), are maintained with a tractor mounted tree trimmer and/or manually using chainsaws/pole-saws. This is used for maintaining a vertical cut up to 15-ft along the existing tree line/mow line. No trees or branches with cavities will be removed without a prior inspection by biological resources or other approved staff. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP or placed in an approved pile burn location. Cut material will no longer be dumped or piled within ENP without a clear plan for disposal.

Routine vegetation management is performed on a bi-monthly schedule from approximately May 1st to November 30th (corresponding with the wet season in South Florida) and a monthly schedule between approximately December 1st and April 30th (corresponding with the dry season – and peak visitor season in South Florida). Work is generally performed between the hours of 7:00 am and 5:00 pm with considerations made based on anticipated visitor arrivals/departures in certain areas of ENP. All mowed vegetation is usually cut to the height between 1.5 – 2.5 in (in) for mowed areas, and woody vegetation side trimmed to a maximum of 15 ft above the ground surface along the established boundary.

Hazardous Tree Management

Trees around the developed areas, facilities and paved roads identified in this document that pose a documentable risk to human safety, infrastructure damage, and/or vehicles and other property damage, will be assessed and prioritized for mitigation based on the location and level of risk the tree may pose. Over the lifespan of this document, hazardous tree management is expected to take place at all developed sites included in this project in all districts. Mitigation measures to reduce or eliminate hazards will be determined by a qualified individual and will represent the minimum necessary to remedy the identified issue. Actions to reduce or eliminate risk will include pruning of hazardous branches, removal of dead or dying portions of trees, and in some instances may require complete removal of a tree. Stump grinding may occur in locations where complete removal of a tree was required. All tree trimming or removal will be carried out with

hand powered (pruners, loppers, bow saws, etc.) and gasoline powered tools (chainsaws, pole saws, stump grinders). Equipment such as bucket trucks, bobcats, trucks, trailers and dumpsters may be utilized for tree work and removal of debris. Vegetation debris resulting from work may be chipped into mulch for immediate transport and use within ENP in appropriate and previously designated landscape features, disposed of in a designated trash receptacle (e.g. a dumpster) within ENP or hauled and legally disposed of at an appropriate facility outside of ENP. In cultural landscapes and maintained visitor contact areas, re-planting of trees to replace removed trees may occur.

The following trees are the predominant species found in developed areas throughout ENP: West Indian mahogany (*Swietenia mahogani*), wild tamarind (*Lysiloma latisiliquum*), gumbo limbo (*Bursera simaruba*), strangler fig (*Ficus aurea*), satinleaf (*Chrysophyllum oliviforme*), pigeon plum (*Coccoloba diversifolia*), sea grape (*C. uvifera*), live oak (*Quercus virginiana*), slash pine (*Pinus elliottii*), cabbage palm (*Sabal palmetto*), poisonwood (*Metopium toxiferum*), Paurotis palm (*Acoelorraphe wrightii*), royal palm (*Roystonea regia*), coconut (*Cocos nucifera*). Other tree species, both native and non-native, are present in limited numbers within developed areas.

Vista Clearing

Vista clearing throughout ENP is performed to reduce the height of vegetation immediately adjacent to paved roads where the limestone fills for the roadbed intergrades with adjacent, graminoid dominated wetland areas. Changes in hydrology and alteration of fire patterns due to the road favors the growth of trees and shrubs in areas that would otherwise have been predominately sawgrass (*Cladium jamaicense*), muhly grass (*Muhlenbergia capillaris*) or spikerush (*Eleocharis cellulosa*) dominated wetlands. Other locations in ENP, where vista clearing may be necessary, include: areas of salt marsh/batis marsh adjacent to paved roads, ditches, margins of developed sites where disturbed fill is adjacent to freshwater marsh, shores of lakes, pond/lake edges, and edges of open water areas including canals. Once woody species become established, they appear to create conditions favorable for expansion both along the road and into adjacent wetlands to a degree. This consequently results in a hedge row effect that blocks roadside views into the otherwise open plant communities within ENP and may reduce the natural expansiveness and continuity of these wet grasslands/marshes. The vegetation proposed to be trimmed is assumed to be, at least in part, within jurisdictional wetlands. Wetland delineations of proposed vista clearing areas have not been carried out and are not proposed.

The vista clearing work includes the initial reduction and subsequent maintenance of the hedge row in locations identified by ENP, including along Main Park road, Shark Valley Tram Road and parking lot edges within developed areas. The maps included in text identify the areas (purple lines) where vista clearing may be done. In the future, additional areas may develop hedgerows and management of these areas would be required. For the purposes of this BA, all roadways and developed areas within ENP where hedgerow establishment may occur, may require this type of management. The work is only being proposed in areas where these roads are adjacent to open graminoid wetlands and will not occur within pine rockland, rockland hammock, tree islands, cypress domes or areas where any red mangroves (*Rhizophora mangle*) would be impacted by the work. Vista clearing is typically accomplished using a tractor

mounted Machete (Alamo Industrial) or similar arm mounted brush cutter with a maximum outer reach of 12-ft (ft). Vegetation will be trimmed in place to a height of 6-12 in. All wheeled equipment will remain within the disturbed, non-wetland fill of the roadbed to prevent rutting impacts within wetlands and additional damage to wetland vegetation. Hand clearing with chainsaws and/or pruning saws of individual trees/shrubs may also be carried out in these areas as needed. Hand cleared vegetation will be removed, chipped into a truck, and disposed of properly at approved off-site waste disposal site. Once initial vegetation trimming is carried out, ENP intends to maintain these areas in a trimmed state using similar equipment and conditions, approximately every 3 years, depending on the rapidity of vegetation growth.

The following shrub and tree species occur within or adjacent to the roadbed and will likely be impacted as a result of this work: Brazilian peppertree (*Schinus terebinthifolius*), buttonbush (*Cephalanthus occidentalis*), buttonwood (*Conocarpus erectus*), cabbage palm (*Sabal palmetto*), Carolina willow (*Salix caroliniana*), cocoplum (*Chrysobalanus icac*o), Dahoon holly (*Ilex cassine*), groundselbush (*Baccharis glomerulifora*), gumbo limbo (*Bursera simaruba*), Jamaican dogwood (*Piscidia piscipula*), live oak (*Quercus virginiana*), Paurotis palm (*Acoelorraphe wrightii*), pineland acacia (*Acacia pinetorum*), poisonwood (*Metopium toxiferum*), pond cypress (*Taxodium ascendens*),saw palmetto (*Serenoa repens*), seagrape (*Coccoloba uvifera*), swampbay (*Persea palustris*), sweetbay (*Magnolia virginiana*), wax myrtle (*Myrica cerifera*), West Indian mahogany (*Swietenia mahogany*), wild tamarind (*Lysiloma latisiliquum*) and willow bustic (*Sideroxylon salicifolia*).

The proposed action would occur within the following three districts of ENP: Pine Island District; Flamingo District; and the Northwest District vegetation maintenance areas. Figure 1 shows an overview of the entire Action Area.

Pine Island District

Entrance Station

The entrance station is located just beyond the Ernest Coe Visitor Center along Main Park Road. This is an NPS operated station at which visitors pay the entrance fee to enter the ENP in Miami-Dade County. As this is the primary entrance to ENP, this is one of the most heavily trafficked areas in ENP. The entrance station, as well as the roadway on either side of the entrance station (i.e. Main Park Road) is paved. There are currently five (5) grassy islands within the median of the roadway and the roadside area along each side which require regular mowing. The entrance station is surrounded by pineland habitat on both sides of the road.

Maintenance Description

The area around the entrance station is currently mowed and maintained for appearance and fire safety purposes. The five islands within the median of the roadway would continue to be mowed using primarily zero-turn mowers, and the roadside areas would continue to be mowed by flex-wing rotary cutters pulled behind a tractor or zero-turn mowers. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Ernest Coe Visitor Center

The Ernest Coe Visitor Center is located along the north side of the Main Park Road and is the first visitor center and employee facility upon entering ENP in Miami-Dade County. This visitor center consists of two parking areas, a visitor building, a restroom building, employee office building, the roadway and two median islands. Visitors often stop at this center throughout the day as this is the first stop upon entering ENP. The visitor center is typically where visitors receive information for their ENP trip. The second large building serves as the ENP headquarters and is not open to the general public. The areas around the buildings are included in ENP's current and long-established routine maintenance program and are mowed and maintained for aesthetics and ease of access.

Maintenance Description

The area around the Ernest Coe Visitor Center is currently mowed and maintained for appearance purposes, access by visitors, and for fire safety purposes. The areas around the buildings, within the roadway median, and parking lot islands will all continue to be mowed and maintained to its current configuration. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along the margin of the developed site where disturbed fill is adjacent to freshwater marsh habitat.

Bill Robertson Area

The Bill Robertson Center is an employee facility used primarily by the NPS's fire, museum, and intern staff and is located along the north side of Research Road. There are two main buildings on the site, one of which is the NPS staff office building and the second is the firehouse. There are also two paved parking lots. The firehouse parking lot serves as a storage facility for fire trucks and other vehicles used during prescribed burns and fire avoidance and management. The site is surrounded by marsh wetland consisting of typical Everglades wet prairie and freshwater marsh species (e.g. *Panicum spp., Sagittaria lancifolia, Pontedaria cordata, Eleocharis spp., Rhynchospora colorata*, etc.). The open field areas surrounding these facilities, which are included in ENP's current and long-established routine maintenance program, are at a slightly higher elevation compared to the surrounding marsh and consist primarily of typical Florida field/lawn grasses.

Maintenance Description

The area of higher elevation at which the Bill Robertson Center was built is the area that is mowed and maintained. The area is mowed using zero-turn mowers and trimming occurs around the buildings as needed. The mowers only mow these slightly elevated open field areas to the existing (and always apparent) mow-line to avoid impacts to the adjacent wetlands. The limits of mowing (the mow-line) are apparent due to the change in elevation between the marsh and the maintained area. There is a toe of slope along the border of the property, which coincides with

the presence of wetland vegetation. During wet conditions, the water level can exceed the toe of slope. In this instance the mowing occurs up to the waterline. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Borrow Pit

The Borrow Pit is located off the Maintenance Yard Entrance Road (Old Ingraham Highway) and is a mowed facility included in ENP's current and long-established routine maintenance program adjacent to a borrow pit. The site is used to stage equipment and large debris. The site is surrounded by pine rockland habitat.

Maintenance Description

The borrow pit area is mowed and maintained using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. Although an old road (possible fire break) continues along the edge of the Borrow Pit, this road is not to be regularly maintained due to sensitive resources. Biological resources staff should be consulted prior to any tree maintenance occurring in the area.

Daniel Beard Center

The Daniel Beard Center is an NPS employee facility primarily used by ENP's science and museum staff. The site has one main building and a larger mowed and maintained area for storage of miscellaneous research items (e.g. vehicles, boats, etc.). There is also a designated helicopter landing site on the site that is partially surrounded by a chain-link fence. The site is surrounded by marsh wetland consisting of typical Everglades wet prairie and freshwater marsh species (e.g. *Panicum* spp., *Sagittaria lancifolia*, *Pontedaria cordata*, *Eleocharis* spp., *Rhynchospora colorata*, etc.). The mowed area, included in ENP's current and long-established routine maintenance program, is at a slightly higher elevation compared to the surrounding marsh and consists of typical Florida field/lawn grasses.

Maintenance Description

The area of higher elevation at which the Daniel Beard Center was built is the area that is mowed and maintained. This area is mowed using zero-turn mowers and trimming occurs around the buildings and chain link fence as needed. The mowers only mow these slightly elevated open field areas to the existing (and always apparent) mow-line to avoid impacts to the adjacent wetland grasses. The limits of mowing (the mow-line) are apparent due to the slight change in elevation between the marsh and the maintained area. There is a toe of slope along the border of the property, which coincides with the presence of wetland vegetation. During wet conditions, the water level can exceed the toe of slope and, in this instance, the mowing occurs up to the waterline. String trimmers are used to maintain vegetation around buildings, fencing, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Royal Palm Visitor Center

The Royal Palm Visitor Center is located at the end of Royal Palm Road. The site has a parking lot, a small visitor center with restrooms, and a boardwalk. The site is surrounded by mixed hardwood hammock and mixed hardwood wetlands. The site has a shallow lake directly next to the visitor center boardwalk, which leads to the surrounding mixed hardwood wetland. The site is included in ENP's current and long-established routine maintenance program and is maintained for access and to improve the viewshed of the surrounding ecosystem for the visitors.

Maintenance Description

The Royal Palm Visitor Center requires mowing around the visitor center building and small grass field between the boardwalk and the visitor center parking lot. The parking lot has two grassy islands, which require mowing. The mowing is conducted using a zero-turn mower. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. There is an embankment on the lake along the boardwalk that is mowed using a tractor mounted tree and grass trimmer.

Old Ingraham Highway

The Old Ingraham Highway extends from the Royal Palm Visitor Center to the west/northwest towards Hidden Lake and ultimately meets Hidden Lake Access Road. The old roadway is approximately 12 ft wide and crosses through rockland hammock and mixed hardwood habitat. The roadway is included in ENP's current and long-established routine maintenance program, which is comprised of mowing the field/lawn grass trail and maintaining a vertically cut tree/hedge line at the edge of mowing.

Maintenance Description

The roadway is maintained by using flex-wing rotary cutters pulled behind a tractor. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure.

Hidden Lake Access Road

The Hidden Lake Access Road provides access to Hidden Lake and connects to Old Ingraham Highway. This paved road, as well as the road to the Hidden Lake's facilities and the facilities themselves, are included in ENP's current and long-established routine maintenance program, and the roadside shoulder is maintained to allow for vehicle pull off, assist in fire prevention, and enhance fire break efficiency. The roadway cuts through mixed hardwood hammock habitat.

Maintenance Description

The maintenance consists of performing a single pass using a flex-wing rotary cutter pulled behind a tractor on each side of the roadway to maintain the shoulder of the road. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur adjacent to Hidden Lake. Vista management will be coordinated with resource management staff as this area has high bat activity and Florida bonneted bats have been recorded in the area.

Pine Island Maintenance Yard

The Pine Island Maintenance Yard is located at the end of Maintenance Yard Entrance Road (Old Ingraham Highway) and is adjacent to the Pine Island Housing Area. The site is included in ENP's current and long-established routine maintenance program and features a large, paved lot with three buildings inside the paved lot and two buildings at the edges. It is the location that NPS maintenance equipment (i.e. tractors, mowers, etc.) are stored and serviced. It is also the location of the above ground storage tanks to fuel ENP's equipment and vehicles. The yard is surrounded by pine and mixed hardwood hammock and is completely enclosed by a chain-link fence.

Maintenance Description

The maintenance at this site consists of mowing around the edges of the paved area and the buildings to the existing tree line. This area is mowed using zero-turn mowers and/or tractor pulled flex-wing rotary cutter mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Pine Island Housing Area

The Pine Island Housing Area is located at the end of Maintenance Yard Entrance Road (Old Ingraham Highway) and is adjacent to the Pine Island Maintenance Yard. The site is included in ENP's current and long-established routine maintenance program and consists of a main loop drive, 15 houses, and 11 trailer pads.

Maintenance Description

The maintenance of the Pine Island Housing area consists of mowing the lawns and grassy areas around the houses, trailer pads, and main road. The limits of the mowing are to the Maintenance

Yard Entrance Road and the existing tree lines. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Long Pine Key Access Road

The Long Pine Key Access Road is an arterial road off the Main Park Road which provides access to the Long Pine Campground. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for visitor vehicle pull off, and assist in fire prevention and firebreak efficiency. The roadway traverses through pine rockland and rockland hammock habitat.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulders. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure.

Long Pine Key Camping Ground

The Long Pine Key Campground campsite and picnic area includes an entrance road, campground access roads, campground pads, a lake, an amphitheater associated parking area, fee station, RV sewage pump-out station, pump houses, a former camp tender's quarters and a general picnic area. The main camping area is surrounded by a paved loop road with a series of paved roads off which the campsites are located. Each campsite includes a paved parking spot and an area maintained as lawn with a fire ring and picnic table. Comfort stations and showering facilities are located within the campground and maintained trails connect the sites to the facilities throughout the campground. Belowground infrastructure (water and electric standpipes, drain fields and septic tanks) is found in previously disturbed areas throughout the site. Unmaintained vegetation within and throughout the site is pine rockland habitat and is designated as critical habitat for Bartram's scrub hairstreak and Florida leafwing butterflies.

Maintenance Description

The maintenance of the mowed and maintained areas within the Long Pine Campground consists of mowing around the edge of the lake, around the camping pads, and around the isolated patches of pine trees and understory. The work is performed using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur

when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along the shoreline of the lake. Vista management will be coordinated with the wildlife biologist as this area has high bat activity and Florida bonneted bats have been recorded in the area.

Mahogany Hammock Road

The Mahogany Hammock Road is an arterial road off the Main Park Road which provides access to the Mahogany Hammock parking area and trail. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulder is maintained to allow for vehicle pull off, assist in fire prevention, and enhance fire break efficiency. The roadway cuts through freshwater marsh communities with scattered islands of pine rockland.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management is proposed to occur along the entire length of the access road and around the parking area where disturbed fill is adjacent to open wetland communities.

Maintenance Yard Entrance Road

The Maintenance Yard Entrance Road (Old Ingram Highway) is an arterial road off the Main Park Road which provides access to the Borrow Pit, Pine Island Maintenance Yard, and Pine Island Housing Area. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for visitor vehicle pull off, and assist in fire prevention and enhance firebreak efficiency.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate

location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along portions of the road that are adjacent to graminoid dominated wetlands.

Pahayokee Trail Parking Area

The Pa-hay-okee Trail Parking Area is a small, looped parking area at the end of an arterial road of Main Park Road, which allows access to the Pa-hay-okee Trail. The parking area is included in the ENP's current and long-established routine maintenance program and consists of an entrance roadway, parking spaces, a grassy median, and a mowed and maintained fringe around the perimeter of the parking area. The mowed fringe is bordered by a mixed hardwood buffer with freshwater marl prairie beyond the buffer.

Maintenance Description

The maintenance of the Pa-hay-okee Trail Parking Area consists of mowing the grassy fringe around the paved parking surface and within the median. This work is performed using zero-turn mowers. The roadway portion of the parking area is mowed using a tractor pulled flex-wing rotary cutter mower. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Pineland Trail Parking Area

The Pineland Trail Parking Area is a small U-shaped parking area connected to Main Park Road on both ends that allows access to the Pineland Trail. The parking area is included in ENP's current and long-established routine maintenance program and consists of parking spaces and a mowed and maintained fringe around the perimeter of the parking area. The mowed fringe is bordered by pine rockland.

Maintenance Description

The maintenance of the Pineland Trail Parking Area consists of mowing the grassy fringe around the paved parking surface. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Research Road

Research Road is a 2-lane paved road that connects to Royal Palm Road. Research Road provides staff and visitors access to Daniel Beard Center, Bill Robertson Center, and Nike Missile Site. The road is paved, and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for vehicle pull off, and assist in fire prevention and enhance firebreak efficiency.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands. Vista management will be coordinated with resource management staff as Florida bonneted bats as well as Eastern black rails have been documented in this area.

Royal Palm Access Road

Royal Palm Access Road is an arterial road of Main Park Road which provides access to the Royal Palm Visitor Center. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for visitor vehicle pull off, and assist in fire prevention and enhance firebreak efficiency.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands.

Main Park Road

Main Park Road provides access from ENP's entrance heading south to its terminus in the Flamingo District. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances,

preserve the fog line visibility, allow for visitor vehicle pull off, and assist in fire prevention and enhance firebreak efficiency. The full extent of the roadway traverses through several habitats; however, in the Pine Island district the road primarily intersects freshwater marl prairie and pine rockland.

Maintenance Description

The roadside maintenance consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands.

Nike Missile Grounds

The Nike Missile Grounds is a former (inactive) Nike-Hercules missile base within ENP. The Nike Missile Grounds area is included in ENP's current and long-established routine maintenance program and consists of three missile barns, a missile assembly building, a guard dog kennel, barracks, two Nike Hercules missiles, and the Missile Base Road leading to these facilities. This area is surrounded by freshwater marl prairie. The Missile Base is surrounded by perimeter fencing.

Maintenance Description

The roadside maintenance along Missile Base Road consists of performing a single pass using a tractor pulled flex-wing rotary cutter mower on each side of the roadway to maintain the shoulder. All vegetation within the fenced area is maintained. A tractor mounted mower or zero-turn type mowers are used within the grounds and around the missile base infrastructure. String trimmers are used to maintain vegetation around signs and other infrastructure. Air blowers are used to clear walkways, parking areas and similar features. Woody vegetation is periodically removed from the unpaved surface of the missile barns and other infrastructure using hand tools. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands.

Chekika Area Grounds

The Chekika Area Grounds consist of a small parking area allowing access to a public boardwalk and a maintenance facility used by the maintenance staff for storage and staging as needed. The parking area is a small loop consisting of a grassy fringe and grassy parking lot island. This site had previously been included in ENP's routine maintenance program but is not currently maintained. This area has been included in this document as ENP may determine it should be added to the routine maintenance program in the future.

Maintenance Description
The area around Chekika Parking Area is mowed along the fringe of the paved surface and within parking lot islands. The maintenance area is mowed to a fence line that encloses the maintenance yard at the site. All areas at this site are mowed using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in the area where infrastructure is adjacent to graminoid dominated wetlands.

Sisal Pond
The Sisal Pond area is located off the Main Park Road and consists of a small, unpaved parking area adjacent to Sisal Pond. This area has previously been included in ENP's routine vegetation maintenance program but is not currently maintained. This area has been included in this document as ENP may determine it should be added to the routine maintenance program in the future.

Maintenance Description
The area around the dirt/gravel pathway would be mowed and maintained using zero-turn type mowers in a similar manner as the paved roads throughout ENP. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along the access road in areas adjacent to graminoid dominated wetlands or adjacent to the pond.

Chekika Area Roads
The Chekika Area Roads consists of several paved roads around the north-eastern border of ENP and lead to the Chekika Campgrounds area. These paved roads are surrounded by freshwater marl prairie and are included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for visitor vehicle pull off, and assist in fire prevention and enhance firebreak efficiency.

Maintenance Description
The roadside maintenance consists of mowing the shoulders using either a tractor pulled flex-wing rotary cutter mower or zero-turn type mower on each side of the roadway to maintain the shoulder. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-

saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along roadways adjacent to graminoid dominated wetlands.

Flamingo District

Main Park Road

Main Park Road, in Flamingo District, extends from the end of Pine Island District (Mahogany Hammock turn-off) to the Flamingo District campgrounds. This paved road is included in ENP's current and long-established routine maintenance program and the roadside shoulders are maintained to manage park appearances, preserve the fog line visibility, allow for vehicle pull off, and assist in fire prevention and enhance firebreak efficiency. The roadway cuts through freshwater marl prairie for approximately 5 mi where the surrounding habitat transitions to hardwood hammocks, buttonwood hammocks and mangrove swamps. The terminus of Main Park Road is within coastal prairie habitat. Eastern black rails have been documented near the highway in the marl prairie as well as in the coastal prairie habitat. American crocodiles are known to nest along the edge of the highway in areas where there is easy access to water.

Maintenance Description

The routine maintenance along Main Park Road consists of a single pass of the roadside vegetation using a tractor pulled flex-wing rotary cutter mower along each side of the roadway up to the existing tree line. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where the roadway is adjacent to graminoid dominated wetlands.

Paurotis Pond

The Paurotis Pond developed area consists of approximately 720 ft of paved roadway including a turn-off from Main Park Road, parking areas and a round-about. This paved road is included in ENP's current and long-established routine maintenance program and the adjacent tree line consists of buttonwood hammocks, mangroves and disturbed uplands. The maintained area includes a picnic table and breaks in the tree line along the shore for scenic views of the pond. Informational signs indicate areas where access is prohibited during certain times of the year due to active bird nesting colonies.

Maintenance Description

Routine maintenance of the Paurotis Pond area consists of mowing along the paved areas, up to the tree line, and within the round-about island. Mowing is typically completed using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may be carried out in the visitor parking and picnic area where the fill pad is adjacent to Paurotis Pond.

Nine Mile Pond

The Nine Mile Pond developed area consists of approximately 800 ft of a paved U-shaped turn-off from Main Park Road, and parking areas. This paved road is included in ENP's current and long-established routine maintenance program and the adjacent tree line consists of hardwood/buttonwood hammocks, mangroves and disturbed uplands. The parking area abuts approximately 250 ft of mowed vegetation along the shoreline of the pond. The area also includes informational signage, picnic tables and rental kayaks.

Maintenance Description

Routine maintenance of the Nine Mile Pond consists of mowing vegetation along the paved areas up to the tree line, and existing mow-line along the shoreline, with zero-turn mowers. The waterline varies throughout the year, so precaution must be used when establishing shoreline mowing limits, to avoid any rutting. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may be carried out in the visitor parking and picnic area where the fill pad is adjacent to Nine Mile Pond.

West Lake

The West Lake developed area consists of approximately 600 ft of paved roadway including a turn-off from Main Park Road, parking areas and a round-about. The West Lake area is included in ENP's current and long-established routine maintenance program and includes a small pavilion with picnic tables, restroom facilities, docks, and a boat launch. The paved areas are bordered by mowed and maintained areas of roadside vegetation and a tree line consisting of hardwood/buttonwood hammocks, mangroves, and disturbed uplands. American crocodiles are known to nest along the edges of the pavement as well as in the round-about.

Maintenance Description
Routine maintenance of the West Lake area consists of mowing vegetation along the paved areas, up to the tree line, and within the round-about island. Mowing is typically completed using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Coot Bay
The Coot Bay area is included in ENP's current and long-established routine maintenance program and consists of two mowed and maintained grassy pull-off/parking areas on either side of Main Park Road. The west side pull-off includes an area to launch kayaks, picnic tables and informational signs. The tree line adjacent to the pull-off areas consists of hardwood/buttonwood hammocks, mangroves, and disturbed uplands. American crocodiles have been known to nest along the edge of the highway on the west side pull-off.

Maintenance Description
Routine maintenance of the Coot Bay pull-off areas consists of mowing, with zero-turn mowers, up to the tree line. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may be carried out at Coot Bay Pond where the filled area is adjacent to the open water.

Flamingo Maintenance Yard
The Flamingo Maintenance Yard area is included in ENP's current and long-established routine maintenance program and consists of approximately 3,450 ft of paved roadway from Main Park Road to the entrance of the Flamingo Housing Area. Facilities in the area are fenced and include utilities, maintenance and storage facilities, and a boat basin with docks and a seawall. The tree line adjacent to the roadway, and surrounding the fenced in facilities, includes hardwood/buttonwood hammocks, mangroves, and disturbed uplands. American crocodiles have consistently nested along the edges of the boat basin especially in areas of softer dirt just beyond the cement retaining wall.

Maintenance Description
Routine maintenance includes mowing of the roadside vegetation, to the tree line, with a batwing tractor mower on either side of the roadway from Main Park Road to the Flamingo Housing

Area. Zero-turn mowers will be used to mow up to the existing edge of the boat basin, along the fences and up to the tree line surrounding all facilities. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Flamingo Housing Area

The Flamingo Housing Area is included in ENP's current and long-established routine maintenance program and consists of approximately 1,000 ft of paved roadway including a round-about, parking areas, and 10 housing units. The paved areas are surrounded by grassy areas that are mowed and maintained with landscaped trees. The northern and eastern tree lines consist of hardwoods/buttonwood hammocks, mangroves, and disturbed uplands. The southern tree line consists of mangroves and is adjacent to Florida Bay.

Maintenance Description

Routine maintenance consists of mowing vegetation around the Flamingo Housing Area, up to the tree lines, using zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management, other than the trimming of red mangrove prop roots, may occur along the southern tree line adjacent to Florida Bay.

Flamingo Visitor Center and Marina

The Flamingo Visitor Center area is included in ENP's current and long-established routine maintenance program and consists of paved roadways and parking areas, mowed and maintained parking islands, a visitor center building, picnic areas, fish cleaning station, boat ramps, boat rentals, vehicle fueling, rest room facilities and marina facilities. American crocodiles consistently nest near the fish cleaning station and on the eastern side of the Whitewater Bay and Florida Bay canal plug.

Maintenance Description

Routine maintenance of the Flamingo Visitor Center area consists of mowing the maintained grassy areas and parking islands. Mowing along the boundaries will occur up to the tree line. Mowing is accomplished using a combination of tractor pulled flex-wing rotary cutter mowers and zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is

scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur within the visitor center area in locations where infrastructure is adjacent to graminoid dominated wetlands or open water.

Eco Pond

The Eco Pond area is included in ENP's current and long-established routine maintenance program and is a loop trail that encircles an abandoned water treatment pond with two small mangrove islands in the center. The trail is on elevated fill and the maintained area is approximately 25-30 ft wide. The trailhead is immediately east of the Flamingo Campground entrance and is a popular area for observing wading birds. There is a small platform on the east side of trail loop. Eco Pond Trail passes through buttonwood hammock, coastal prairie, and disturbed uplands.

Maintenance Description

Mowing of the grassy portion area of the trail will be completed up to the tree line with a tractor pulled flex-wing rotary cutter mower. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around facilities, signs, and other infrastructure. Vista management may take place on the existing trail around Eco Pond where the trail is adjacent to the open water of the pond.

Flamingo Campgrounds and Lodging

Flamingo overnight accommodations include vehicle-based camping at Flamingo Campground, primitive camping at a walk-in group campground and platform based ecotents. Additionally, a lodge with adjoining restaurant is currently being constructed in previously disturbed lands immediately west of the Flamingo Visitor Center parking lot. Finally, a loop access road and parking located immediately west of the lodge and restaurant site was formerly occupied by 12 single family cottages. These structures were destroyed during the 2005 hurricane season and all that remains is the paved access road, parking and foundations for the cottages. The Flamingo Campground includes passenger vehicle-based camping in the A, B and C Loops. Each site has a paved vehicle pullout, tent camp area and a fire ring. A and B Loop each have 2 stand-alone comfort stations and C Loop has one. T Loop consists of a paved loop with paved connector roads and campsites for recreational vehicles with electric and water hookups. Two comfort stations are also located within T Loop. A fee booth is located at the entrance to B, C and T Loop. The walk-in group campground includes paved parking along the northern side of the campground. The facility is minimally developed with each site consisting of a picnic table and fire ring. Two stand-alone comfort stations and a small amphitheater with wooden benches and a wooden stage are located in or adjacent to the walk-in campground. The ecotent

accommodations consist of 20 internal frame canvas structures located on an elevated walkway immediately west of the walk-in group campground. Paved vehicle parking is located immediately north of the walkway along the access road. There are plans to increase the number of ecotents and these would be constructed and maintained in the same manner as the existing ones.

Regular vegetation maintenance is currently carried out in the A and T loops of the Flamingo Campground, around infrastructure and facilities in the walk-in group camping and around the ecotents. Vegetation in the B and C loops of the Flamingo Campground is periodically maintained with prescribed fire and tractor based mowing equipment as resources allow. Vegetation maintenance is not currently taking place at the lodge and restaurant site or at the former cottage site. The area around the future lodge and restaurant is currently cleared and construction on those facilities is underway. Vegetation maintenance will resume in this area once that work is completed. No regular vegetation maintenance is occurring at the former cottage site, but that area is included here in the event that ENP determines that the site needs to be maintained.

The Flamingo Campground is filled and generally surrounded by buttonwood hammock, coastal hardwood hammock, and open salt marsh communities. The ecotent and walk-in group camping area are both located in native grass dominated wetlands immediately north of the Florida Bay shoreline. These sites flood regularly during the wet season and periodically at other times of the year following heavy rainfall, storm surges and extreme high tide events. The lodge and cottage area are in previously filled areas with some wetland areas located in the vicinity of the facilities. The shoreline and adjacent wetland between the amphitheater and the ecotents are popular shorebird stopover areas where shorebirds congregate in large numbers especially during fall and spring migration.

Maintenance Description

Vegetation maintenance in this area is carried out by NPS staff and non-NPS concessions staff. In the Flamingo Campground, vegetation along the outer edge of roadways, access roads and paved campsites would be mowed using a combination of tractor pulled flex-wing rotary cutter mowers and zero-turn mowers. Vegetation in the walk-in campground and ecotent area will be carried out with a combination of tractor mounted mowing equipment and zero-turn mowers. Mowing vegetation adjacent to the roadway, in the round-about island and surrounding the Amphitheater, will be completed with zero-turn mowers up to the tree line and shorelines. During the wet season this entire area can be fully inundated, and areas may not be accessible to mowing equipment. Staff must use precaution around wet areas to avoid rutting. Maintenance of vegetation at the future lodge site and cottage site would be carried out in the same manner as that described for the Flamingo Campground. Initial vegetation management at the former cottage site would likely require brushing or similar removal of woody vegetation that currently occupies the site before regular mowing could be reinitiated.

At all locations, tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the

site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where fill associated with the campground is adjacent to graminoid dominated wetlands. No trees or branches with cavities will be removed without a prior inspection by biological resources or other qualified staff.

Bear Lake Road

Bear Lake Road is included in ENP's current and long-established routine maintenance program and consists of 1.8 mi of unpaved roadway near the end of Main Park Road. This roadway is narrow and leads to the Bear Lake Trail. Bear Lake Road is typically closed to visitor's motor vehicles due to water on the road from June through mid-October or November. These wet, unpaved road conditions create potholes, presenting a threat of damage to vehicles transiting the roadway as well as creating safety hazard when drivers try to avoid the standing water and get too close to the Buttonwood Canal. American crocodiles are known to nest between the Buttonwood Canal and the edge of the unpaved roadway.

Maintenance Description

The Bear Lake Road area will be mowed using primarily zero-turn mowers as the road is narrow and gets too wet for heavier, tractor mounted mowing equipment. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Vista management may occur where the roadway is adjacent to the open water of Buttonwood Canal.

Key Largo Ranger Station

The Key Largo Ranger Station is located along US-1 in Key Largo. This area is included in ENP's current and long-established routine maintenance program and consists of a paved parking lot, dormitory, a research lab, a ranger station, employee housing, boat ramp, a designated helicopter landing site, and a large open grassy area for storage of vehicles, boats, and other equipment. This area is mowed and maintained using zero-turn mowers. The area is mowed to the existing tree line which consists of rockland hammock. Much of the mowed area near the boat ramp and docks is overrun with green iguanas.

Maintenance Description

The area around the Key Largo Ranger Station is mowed using primarily zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road

edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Flamingo Sewer Plant and Access Road

The Flamingo Wastewater Treatment Plant and Access Road is included in ENP's current and long-established routine maintenance program. The site consists of a 1,000-ft unpaved roadway leading from Main Park Road to the wastewater treatment plant. Facilities in the area are fenced and include utilities, an office building and two water treatment buildings. An emergency holding lagoon and percolation pond are located at the site and both are surrounded by an earthen berm. The tree line adjacent to the roadway and bordering the facilities at the site includes hardwood/buttonwood hammock, mangroves forest and disturbed uplands.

Maintenance Description

Routine maintenance includes mowing vegetation surrounding the buildings and other infrastructure and up to the tree line with zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Northwest District

Gulf Coast Housing

The Gulf Coast Housing area is located in Everglades City along the north side of Copeland Avenue between Plantation Parkway and Kumquat Street. This area is included in ENP's current and long-established routine maintenance program and consists of a large, open grassy field with three housing facilities in a primarily developed and residential neighborhood.

Maintenance Description

Routine maintenance of the housing area consists of mowing vegetation surrounding the housing facilities with zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Gulf Coast Visitor Center Area and Interpretive Trail

The Gulf Coast Visitor Center is located at 815 Oyster Bar Lane in Everglades City. This area is included in ENP's current and long-established routine maintenance program and consists of a paved roadway entrance and parking areas, picnic areas, a visitor center building, a large open field area, rest room facilities, marina facilities, kayak launching area, park staff housing and R/V camping areas. The Interpretive Trail is a small, unpaved pedestrian pathway with its entrance near the southeast corner of the property that meanders through the more wooded area and along the mangrove fringe at the coastline.

Maintenance Description

Routine maintenance of the Gulf Coast Visitor Center area consists of mowing the maintained grassy areas up to the tree lines, and the paved areas and parking islands. Mowing along the boundaries occurs up to the tree line. Zero-turn mowers should be used along the Interpretive Trail and other areas along the shoreline as these areas are narrow pedestrian walkways which occasionally are wet from high tide events. Caution should be used when mowing near ENP's entrance to avoid damaging the traffic counter protection containers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, other infrastructure, and the Interpretive Trail. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas adjacent to South Copeland Avenue.

Loop Road Education Center

The Loop Road Education Center is included in ENP's current and long-established routine maintenance program and is a fully fenced property that consists of three (3) park facilities, permanent camping structures, picnic areas, as well as a 4 to 5-ft area of maintained vegetation on either side of the road at the entrance. Prior to the beginning of proposed vegetation maintenance, ENP will be clearing a 5-ft buffer around the outside of the existing fence line to prevent vegetation from damaging the fence as well as helping prevent potentially dangerous wildlife (e.g. Florida panther and black bears) from entering the compound.

Maintenance Description

Routine maintenance around the education center includes mowing of vegetation within the fence line of the property with zero-turn mowers. Additionally, a 5-ft buffer outside the fence line will be cleared of all vegetation and will then be maintained with regular mowing. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road

edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Shark Valley Area

The Shark Valley Area is included in ENP's current and long-established routine maintenance program and consists of approximately 2,200 ft of Park entrance roadway, administration facilities, a ticketing booth, comfort station, a visitor center and a 16-mile paved asphalt trail loop. The loop trail is an elevated, paved trail leading from the visitor center to the Shark Valley Observation Tower and back. The area is surrounded by Shark River Slough and its associated plant communities. A canal lies adjacent to the western edge of the western portion of the loop trail path from the observation tower all the way to Tamiami Trail.

Maintenance Description

Routine maintenance consists of mowing both sides of ENP entrance road, maintained areas around park facilities and visitor center, parking islands and both sides of the Shark Valley Loop. On the east side of the entrance road mowing will occur to the tree line and along the west side mowing will occur to the water's edge. Both sides of the loop path are to be mowed 4 to 6 ft or until the water's edge near the existing canal. The sloped areas between the path and adjacent canal are to be mowed and trimmed to maintain visitor line of site into the water. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur along the entire length of Shark Valley Tram Road and visitor parking areas, as well as areas where Shark Valley Tower Facilities are adjacent to graminoid dominated wetlands.

Tamiami Ranger Station

The Tamiami Ranger Station property along Loop Road is included in ENP's current and long-established routine maintenance program and consists of two housing areas, two park buildings/facilities, parking areas, a remnant boat ramp and the mowed and maintained infield areas within the property limits. This area is primarily used for seasonal and/or permanent housing for Park staff along with equipment storage and is not a destination for Park visitors.

Maintenance Description

Routine maintenance of the ranger station area consists of mowing vegetation surrounding ENP's buildings and parking area up to the tree lines with zero-turn mowers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs,

walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Loop Road Trail Center

Loop Road Trail center is included in ENP's current and long-established routine maintenance program and consists of an open field at the entrance, several NPS facilities and approximately 3,000 ft of gravel road, looping around a borrow pit/pond, that leads to housing on the western property boundary. Similar to the Tamiami Ranger Station, this area is primarily used for seasonal and/or permanent housing for park staff along with equipment storage and is not considered a destination for park visitors.

Maintenance Description

Routine maintenance at the Loop Road Trail Center area includes mowing along the gravel roadway from the entrance to ENP housing at the western park boundary, as well as within the open field at the entrance. Mowing will take place on both sides of the gravel roadway and within the open field to the tree line. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where fill is adjacent to the existing borrow pit.

Gator Park

Gator Park located along the south side of US-41/Tamiami Trail, is not currently included in ENP's current and long-established routine maintenance program but represents an area that requires future vegetation maintenance. This area consists of an airboat launch, parking area, several small buildings/facilities and looping dirt road around a small pond. This is a concession managed facility that provides services, including airboat rides, to park visitors into ENP.

Maintenance Description

Routine maintenance at Gator Park includes mowing along the gravel/dirt roadway from the entrance around the pond, as well as within the open field at the entrance. Mowing will take place on both sides of the gravel roadway to the tree line. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features. Vista management may occur in areas where fill is adjacent to the existing borrow pit.

Coopertown

Coopertown is located along the south side of US-41/Tamiami Trail and is not currently included in ENP's current and long-established routine maintenance program but represents an area that requires future vegetation maintenance. This area consists of an airboat launch, parking area and several small buildings/facilities. Similar to Gator Park, this concession managed property provides visitor services including airboat rides into ENP.

Maintenance Description

Routine maintenance at Coopertown airboat launch area includes mowing along the roadway at the entrance and any open/grassy areas around the buildings. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Frog City

Frog City is located along the south side of US-41/Tamiami Trail and is not currently included in ENP's current and long-established routine maintenance program but requires future vegetation maintenance. This area has a locked gate just off the highway and consists of a short dirt road leading to an airboat launch. The primary use of this property is an airboat launch which is used by researchers and park staff for administrative purposes. The former use of this site was a tourist attraction but is now no longer accessible to the general public. Vegetation at much of the facility is now a mixture of native and non-native planted and ruderal vegetation on disturbed fill.

Maintenance Description

Vegetation maintenance at the Frog City airboat launch area includes mowing/weeding along the dirt pathway up to the airboat launch. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers may be used to maintain vegetation around buildings, signs, and other infrastructure.

Entercom

Entercom is located along the south side of US-41/Tamiami Trail and is not currently included in ENP's current and long-established routine maintenance program but represents an area that requires future vegetation maintenance. This area consists of a paved pathway leading to several tower structures. This area is not open to the public.

Maintenance Description
Routine maintenance at the Entercom area includes mowing along the dirt pathway up to the airboat launch. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure.

Everglades Safari Park
The Everglades Safari Park area is located along the south side of US-41/Tamiami Trail and is not currently included in ENP's current and long-established routine maintenance program but represents an area that requires future vegetation maintenance. This area consists of a parking lot off of US-41/Tamiami Trail, several small buildings, airboat docks and launch and other visitor amenities. Similar to Gator Park, this concession managed property provides visitor services including airboat rides into ENP.

Maintenance Description
Routine maintenance at the Everglades Safari Park area includes mowing along the paved pathways and around the parking area. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

East Everglades Operations Center
The East Everglades Operations center is located on the northeast corner of the intersection of SW 172nd Avenue and SW 160th Street and is not currently included in ENP's current and long-established routine maintenance program but may be an area that requires future vegetation maintenance. This area consists of a mainly cleared property with several small facilities for NPS staff. This area is not visited by ENP visitors.

Maintenance Description
Routine maintenance at the East Everglades Operations Center area includes mowing/weeding within the property. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

Salem Radio
The Salem Communications Radio Tower is located along the south side of US-41/Tamiami Trail and is not currently included in ENP's current and long-established routine maintenance

program but may be an area that requires future vegetation maintenance. This area consists of narrow, unpaved road leading to radio/communications towers. This area is not open to the public for safety reasons.

Maintenance Description

Routine maintenance at the Salem Radio area would include mowing/weeding along the unpaved pathway up to the towers. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure. Edging along paved and concrete surfaces such as road edges, curbs, walkways, and sidewalks may be carried out as needed. Air blowers are used to clear walkways, parking areas and similar features.

L-67 Extension Trail

The L-67 Extension Trail is located off the south side of US-41/Tamiami Trail to the east of the L-67 Canal. This area consists of a narrow unpaved trail that begins at US-41 and runs approximately 5.4 mi south into ENP. Maintenance activities in this location are currently carried out by SFWMD under a vegetation management easement.

Maintenance Description

Routine maintenance at this site includes mowing the grassy maintained area between the canal and the unpaved trail. Tree line trimming, with a tractor mounted trimmer or manually using chainsaws/pole-saws, will occur when necessary up to a height of 15 ft. Trimmed material is scattered and left in place to decompose. Larger material is cut into manageable size, then cast into surrounding vegetation to decompose. In some cases, cut material may be removed from the site and disposed of in an appropriate location outside of ENP. String trimmers are used to maintain vegetation around buildings, signs, and other infrastructure.

CONSERVATION MEASURES

The following conservation measures are included in the proposed action to avoid and minimize effects to the American crocodile, Everglades bully, Florida pineland crabgrass, and Florida prairie-clover. Conservation measures for the federally listed species and critical habitats that are determined to not likely be adversely affected by the proposed action are listed in Appendix A.

Conservation measures for American crocodile

- Staff or contractors performing the vegetation maintenance program will be informed of the potential to encounter the American crocodile and instructed to avoid impacting individuals and nests if present.
- If breeding behavior or nesting is observed near locations where routine maintenance is being conducted, NPS biological staff will be contacted. NPS biological staff may authorize work to continue within certain areas if a buffer distance can be used to avoid impacts to nests.

- If a crocodile is observed during maintenance activities outside of the breeding season, activities will cease until the crocodile has vacated the area on its own accord.
- Nests and nesting activity will be documented (i.e. GPS coordinates and/or picture) and reported to the Biological Resources Branch Chief and/or Threatened and Endangered Species Biologist.
- Vista clearing activities and roadside trimming with heavy equipment in areas with potential crocodile (or alligator) nesting will be prohibited during the peak nesting season typically March-May.

Conservation measures for Everglades bully

- Staff performing the vegetation maintenance program will be informed of the potential presence of Everglades bully and instructed to avoid impacting individuals to the extent possible while conducting this work and meeting objectives of the vegetation maintenance.
- Casting of cut vegetation or discharge of large clippings into undisturbed habitats occupied or potentially occupied by Everglades bully will not be permitted.
- Periodic follow-up inspections will be made by NPS biological resources branch staff to ensure that protective measures are being carried out and that these efforts are successful in minimizing impacts to Everglades bully.

Conservation measures for Florida pineland crabgrass

- Staff performing the vegetation maintenance program will be informed of the potential presence of Florida pineland crabgrass and instructed to avoid impacting individuals to the extent possible while conducting this work and meeting objectives of the vegetation maintenance.
- Casting of cut vegetation or discharge of large clippings into undisturbed habitats occupied or potentially occupied by Florida pineland crabgrass will not be permitted.
- Periodic follow-up inspections will be made by biological resources branch staff to ensure that protective measures are being carried out and are successful in minimizing impacts to Florida pineland crabgrass.

Conservation measures for Florida prairie-clover

- The area along Mahogany Hammock Road (Pine Island District) where Florida prairie-clover is known to occur will be maintained a maximum of two times per year.
- Mowing of the occupied area of roadside will not occur between October 31 and May 1 to reduce impacts to plants during the known reproductive period.
- To reduce impact from covering of plants, accumulations of clippings will be spread evenly at the site or removed from the site following mowing.
- Side trimming of tree line vegetation in the occupied area will only be carried out manually using chainsaws or pole-saws and trimmed materials will not be cast into the area occupied by Florida prairie-clover.
- Staff performing the vegetation maintenance program will be informed of the potential presence of Florida prairie-clover and instructed to avoid impacting individuals to the extent possible while conducting this work and meeting objectives of the vegetation maintenance.

- Periodic follow-up inspections will be made by biological resources branch staff to ensure that protective measures are being carried out and are successful in minimizing impacts to Florida prairie-clover.

DESCRIPTION OF ACTION AREA

The "*Action Area"* is defined under the ESA as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate areas (50 CFR § 402.02). It encompasses the geographic extent of environmental changes (i.e., the physical, chemical, and biotic effects) that will result directly and indirectly from the action. The Action Area is typically larger than the area directly affected by the action."

For the proposed maintenance of vegetation, hazardous tree removal or vista clearing in ENP project, the "Action Area" includes the extent of any resource base that could potentially be significantly affected by the different types of impacts vegetation management activities would cause. The geographic extent of the Action Area, including all potential direct and indirect impacts, is shown in Figure 1, and includes all of the existing maintained vegetation areas along roadways and public use areas, vista points, and employee use areas plus all adjacent areas within 10 ft of these features.

See the previous DESCRIPTION OF THE PROPOSED ACTION section of this BO, for a detailed description of the Action Area.

STATUS OF SPECIES – RANGE WIDE

American crocodile

The American crocodile is a large, new world crocodilian known to occur in coastal habitats in northern South America, Central America, Mexico, the Caribbean, and south Florida in the United States. The Service listed the American crocodile in south Florida as endangered on September 25, 1975 (Federal Register 1975) in accordance with the ESA. The status of the American crocodile in Florida was reclassified by the Service to its current status as threatened on April 19, 2007 (Federal Register 2007), pursuant to the ESA and the American crocodile in Florida was designated as a Distinct Population Segment at that time.

Species description

The crocodile is a large greenish-gray reptile. At hatching, crocodiles are yellowish-tan to gray in color with vivid dark bands on the body and tail. As they grow older, their overall coloration becomes paler and more uniform and the dark bands fade. All adult crocodiles have a hump in front of the eye, and tough, asymmetrical armor-like scutes (scale-like plates) on their backs. The American crocodile is distinguished from the American alligator (*Alligator mississippiensis*) by a relatively narrow, more pointed snout and by an indentation in the upper jaw that leaves the fourth tooth of the lower jaw exposed when the mouth is closed. Moreover, alligators have two nostrils separated by a bony septum covered in skin, while American crocodiles have two nostrils that touch each other in a single depression on the tip of the snout (Ross 2005). In Florida, the crocodile ranges in total length from 26.0 cm (cm) (10.3 in) at hatching to 3.8 m (m)

(12.5 ft [3.81 m]) as adults (Moler 1991). Larger specimens in Florida were reported in the 1800s (Moler 1991) and may occur in south Florida currently, and individuals as large as 6 to 7 m (19.7 to 23.0 ft [6 to 7 m]) have been reported outside the United States (Thorbjarnarson 1989).

Life history / Reproductive biology

Female crocodiles reach sexual maturity at approximately 10 to 13 years of age (about 7.38 ft [2.25 m] total length) (Mazzotti 1983; LeBuff 1957). The size and age that male crocodiles reach sexual maturity is not currently known (Ogden 1978).

Courtship and breeding occur in late winter and early spring, and nests are usually built in late April or early May (Moler 1992). Females will only produce one clutch of eggs per year, although it is not known if a female will produce clutches in consecutive years. See Figure 3 for a photo of a crocodile egg. Nests are constructed on beaches, stream banks, and levees, and many nest sites are used recurrently. See Figure 4 for a representative photo of a crocodile nest in ENP. Female crocodiles usually dig a hole at the nest site but may construct a nest mound at the nesting site by scraping together soil. If a mound is constructed, a hole is dug in the middle of the nest mound prior to egg laying. Approximately 30 to 60 eggs are deposited in the nest hole. Following egg laying, the female covers the eggs with soil and the eggs incubate at the nest site for approximately 85 to 90 days (Moler 1992).

In Florida, female crocodiles have not been observed defending their nest during incubation (Kushlan and Mazzotti 1989). Once the eggs begin hatching, the female usually opens the nest and carries the hatchlings to water in her mouth. See Figure 5 for a photo of female crocodile carrying hatchlings from the nest to water. Hatchlings are not able to escape the nest cavity without assistance from their mother. Crocodile hatchlings remain together in a loose aggregation for several days to several weeks following hatching. Parental care of young crocodiles has not been observed in Florida, although it has been reported in other parts of the American crocodile's range (Moler 1992).

Foraging

Crocodiles are opportunistic feeders and will eat whatever they can catch and consume. Hatchlings feed largely on small fish but will also eat crabs, snakes, insects, and other invertebrates (Moler 1992). Adult crocodiles are capable of taking large prey but generally do not capture prey larger than a raccoon (*Procyon lotor*) or cormorant (*Phalacrocorax auritus*). The diet of adult crocodiles consists of snakes, fish, crabs, small mammals, turtles, and birds (Moler 1992). Crocodiles usually forage from immediately prior to sunset to just after sunrise (Lang 1975; Mazzotti 1983).

Relationships with other species

Under certain circumstances the crocodile may co-occur with the American alligator in south Florida. Co-occurrence of these species is most likely during the non-nesting season or when salinities are low. Most crocodilians are known to tolerate the presence of other crocodilian species provided food and other habitat requirements are not limiting (Service 1999). However, little is known concerning the interspecific interactions that occur between crocodiles and alligators. Alligators and crocodiles both occur within the vicinity of the 5,900-acre

(2,388-hectare) Cooling Canal System (CCS) at Turkey Point Power Plant (TPPP). Anecdotal evidence suggests that crocodiles may aggressively exclude alligators from using a brackish water canal favored by crocodiles known as the Interceptor Ditch (Wasilewski and Lindsay 2004). Nevertheless, crocodiles and alligators have both been reported to construct nests on the same canal berm located in the vicinity of Marco Island in Collier County, Florida (Service 1999).

Crocodiles are most susceptible to predation during incubation and as juveniles. Eggs are taken primarily by raccoons, although depredation rates of crocodile nests are typically low in south Florida. Hatchlings and subadults are known to be taken by a variety of predators including wading birds, gulls, crabs, sharks, alligators (in areas where they co-occur) and adult crocodiles (Service 1999). Adult crocodiles have no known predators other than humans.

Habitat

The crocodile in south Florida occurs primarily in mangrove swamps and along low-energy mangrove-lined bays, creeks and inland swamps (Kushlan and Mazzotti 1989). Deep water habitats (>1.0 meter [3.3 ft]) are also known to be an important component of crocodile habitat (Mazzotti 1983). Crocodiles exhibit seasonal differences in habitat use. In the breeding season during spring and summer, crocodiles commonly occur along coastal shorelines and coves. However, during fall and winter (the non-breeding season) crocodiles were likely to occur more inland within swamps, bays, and creeks (Kushlan and Mazzoti 1989).

Nesting habitat includes sites with sandy shorelines or raised marl creek banks adjacent to deep water (Service 1999). Crocodiles also nest on berms and other sites, such as canal banks where sandy fill has been placed (Dixon 2014). Optimal sites for nesting provide appropriate soils for incubation, are generally protected from wind and wave action, and have access to deeper water (Service 1999).

Population Dynamics

The number of crocodiles that occurred historically in south Florida is difficult to determine because many records are anecdotal, and observers may have confused crocodiles with alligators. Moreover, the remoteness and inaccessibility of estuarine habitats to humans made obtaining a reliable estimate of the crocodile population problematic. (Ogden 1978) estimated a population of 1,000 to 2,000 crocodiles within south Florida during the early 1900s. The crocodile population was depleted due to hunting (crocodiles were legally hunted until 1962) and habitat modification and destruction due to on-going urbanization of south Florida by humans. By the mid-1970s the crocodile population was thought to be reduced to about 100 to 400 animals (not including hatchlings) (Ogden 1978).

In south Florida the crocodile population has increased substantially during the last 40 years. The most recent population estimate suggests that the crocodile population contains 1,200 to 2,000 individuals (not including hatchlings) (Brandt 2017). This estimate was derived using crocodile nesting data and by applying demographic characteristics observed in other crocodilian species (i.e., Nile crocodiles [*Crocodylus niloticus*] and American alligators) suggesting that breeding females make up 4 to 5 percent of the non-hatchling population and about 75 percent of

reproductively mature females breed and nest each year. The most recent data indicates that overall, crocodile populations in south Florida have been stable from 2015 to 2019 (Service 2020).

Nest survey data collected in south Florida also suggest that the crocodile population has increased. Nesting effort has increased from about 20 nests per year in the late 1970s to at least 144 nests in 2014 (Mazzotti et al. 2014a, Lindsay 2014). Surveys detect approximately 80 to 90 percent of nests. A single nest site can contain several nests from different females in close proximity to each other (University of Florida, undated). Observers are generally unable to distinguish those nests that contain more than one clutch of eggs without excavating the nests. In some instances, surveyors are able to determine that more than one female has laid eggs at a communal nest by visiting the nest over a series of days and observing hatching of separate nests. Communal nests that are not distinguishable result in a possible underestimation of nests and/or females. Available nesting data for 2016 indicate that at least 128 nests producing 1,266 hatchlings were observed within designated critical habitat for the crocodile (Mazzoti 2016).

In the early 1970s, the construction of the nearly 6,000-acre CCS, associated with the Florida Power and Light (FPL)'s Turkey Point Nuclear Power Plant, created a system of berms that contained soils favorable for crocodile nesting. The number of nests observed within the CCS increased from 2 nests in the late 1970s to 25 in both 2013 and 2014. However, beginning in 2013 water quality conditions at the CCS deteriorated resulting in warmer temperatures, extreme salinities (> 90 parts-per-thousand (ppt)), an outbreak of blue-green algae, and a significant increase in turbidity. The reason for these conditions is unclear but may have been the cumulative results of FPL's increase in power production within nuclear Units 3 and 4, the discharge of vegetative cuttings from berm maintenance into the CCS, and the drought experienced in the region. Adverse conditions in the water of the CCS likely resulted in: 1) the significant reduction in nesting effort observed in the CCS during 2015 and 2016 (i.e., only 9 and 8 nests observed, respectively); 2) the reduction in number of crocodiles observed in the CCS; and 3) the poor condition of some of the crocodiles observed in the CCS (Mazzotti 2015b). FPL is working with the Service to address the adverse conditions in the CCS and return the CCS to high quality nesting habitat for crocodiles. Current efforts seem to be effective and the water quality appears to be improving since the spring of 2017. From 2015 to 2019, the average number of crocodile nests has increased by 33 percent to 13 nests per year (Service 2020).

Status and Distribution

The present distribution of the American crocodile includes coastal wetlands and rivers of south Florida, Cuba, Jamaica, and Hispaniola, along the Caribbean coast from Venezuela north to the Yucatan peninsula, and along the Pacific coast from Sinaloa, Mexico to the Rio Tumbes of Peru (Moler 1992). Within Florida, the crocodile historically occurred as far north as Indian River County on the east coast and Tampa Bay on the west coast, and as far south as Key West (DeSola 1935; Hornaday 1914; Kushlan and Mazzotti 1989; Allen and Neill 1952; Neill 1971).

Crocodile nesting currently occurs within five distinctive areas within Florida: TPPP; North Key Largo; Crocodile Lake National Wildlife Refuge (CLNWR); Northeast Florida Bay in ENP; Flamingo/Cape Sable in ENP; and, Other (Other is defined as nesting occurring within three

non- contiguous areas consisting of Biscayne Bay from north of the TPPP Site to Virginia Key, Florida's Keys from south of CLNWR to Key West, and the West Coast of Florida from North of Highland Beach to Sanibel Island). (Figure 2). These nesting areas can be considered as functioning sub-populations of the species. The five nesting areas currently observed represents an increase in the number and extent of nesting areas in South Florida since the 1970s. Prior to this time nesting occurred primarily within three nesting areas: Northeastern Florida Bay, North Key Largo, and small portions of the areas designated as "Other". The addition of nesting within the Flamingo/Cape Sable and TPPP have significantly increased nesting for the species in Florida. Based on the nesting data available, the majority of American crocodile nesting in Florida over the past 10 years (2010 – 2019), about 61 percent, occurs in the Flamingo/Cape Sable area, 20 percent in the Northeastern Florida Bay area, 13 percent at the TPPP, 4 percent at North Key Largo, and 2 percent with the areas designated as "Other." We assume that the amount of nesting correlates with the number of crocodiles found within each nesting area. As such, Flamingo/Cape Sable contains the largest sub-population of American crocodiles followed by Northeastern Florida Bay, and the TPPP. The number of crocodiles occurring in North Key Largo and the areas designated as "Other" are considerably smaller. As further evidence of an increase in crocodile numbers in these areas, we note that based on our population size estimates, the overall population of American crocodiles in Florida has increased since the time of listing. We find that this increase corresponds with an increase in the number of crocodiles that occur within each nesting area (Service 2020).

Everglades bully

The Everglades bully was federally listed as threatened under the ESA in November 2017 (Service 2017). Historically, this species had a narrow distribution which was generally restricted to pine rocklands and marl prairies in Collier, Miami-Dade, and Monroe counties. Plants occur in lower elevation pine rocklands, marl prairies and the ecotone between the two habitats. Loss of habitat, drainage and exotic species infestations have reduced the range of this species. The following discussion is summarized from the most recent species assessment (Service 2012a) and from recent publications and monitoring reports.

Species description

Everglades bully is a decumbent or upright shrub, 1-2 m (3-6 ft.) tall. The branches are smooth, slightly geniculate, and somewhat spiny. Leaves are thin, obovate or ovate, 2-5 cm (0.8-2 in) long, evergreen, oblanceolate, and fuzzy on their undersides. The flowers are in axillary cymes (Long and Lakela 1971). Everglades bully is distinguished from the other two subspecies of *S. reclinatum* in Florida by its leaves, which are persistently pubescent (fuzzy) on their undersides, rather than smooth or pubescent only along the mid-vein (Wunderlin and Hansen 2003).

Life history

Everglades bully is restricted to pinelands with tropical understory vegetation on limestone rock (pine rocklands), mostly in the Long Pine Key area of ENP, which is an area of pine rockland surrounded by wetlands. In ENP and BCNP, Everglades bully is found in the pinelands, pineland/prairie ecotones and prairies (Gann et al. 2006; Bradley et al. 2013). Plants are found in low elevation pinelands and pineland/marl prairie ecotones that flood each summer (Gann et al. 2006; Bradley et al. 2013).

Population dynamics

In 2005, the Institute for Regional Conservation (IRC) reported that more than 10,000 plants were found in surveys of Long Pine Key (K. Bradley pers. comm. 2005d). The baseline abundance estimates at Long Pine Key, based on a log10 abundance estimate, is 10,000-100,000 plants (Gann et al. 2005). Gann et al. (2006) found 14 occurrences of this species recorded at 149 sample stations at Long Pine Key. Bradley et al. (2013) conducted surveys in the Gum Slough region of Lostman's Pines in BCNP and reported finding Everglades bully to have limited distribution within that area. A total of 17 plants (representing 0.2 plants/ha) were counted within three pineland plots, that were associated with sawgrass and hardwood habitats in Gum Slough.

Fairchild Tropical Botanic Garden tagged 41 groups of plants, each group consisting of 1 to 6 individuals, for a total of approximately 73 individuals at Larry and Penny Thompson Park (Possley and McSweeney 2005). This is probably the largest population outside of Long Pine Key. Estimated population sizes for the other occurrences are noted by Hodges and Bradley 2006, Gann et al. 2006; K. Bradley pers. comm. 2007; J. Possley, pers. comm. 2011a, 2011b.

Status and distribution

Habitat destruction and degradation resulting from hydrological modifications and exotic species infestations remain the primary threats to populations of this species. Critical habitat has not been designated for this species.

The rounded global status of Everglades bully is T1, critically imperiled (NatureServe 2021). NatureServe (2019) indicates this taxon is a narrow endemic subspecies occurring in sensitive and highly fragmented pine rocklands of southern Florida. Florida Natural Areas Inventory (FNAI) considers Everglades bully to have a global rank of G4G5T1, meaning the species as a whole is "apparently" or "demonstrably secure globally," but the subspecies is "critically imperiled globally" (FNAI 2019a). Everglades bully was considered to be critically imperiled by IRC; however, based upon data collected in the first year of their study, IRC down-ranked this species to imperiled (Gann et al. 2006; Gann et al. 2001-2010). Everglades bully is not listed by the State of Florida.

Historically, Everglades bully was long considered to have a narrow distribution in the tropical pinelands of Miami-Dade County. Gann et al. (2002) provided a history of collections; Everglades bully was first documented at Camp Jackson near what is now the main entrance to ENP. It has been collected several times (starting in 1852) at Long Pine Key. The species has been observed in pinelands east of ENP, the Nixon-Lewis Hammock (where the pinelands have since been destroyed), privately-owned Grant Hammock, and privately owned Pine Ridge Sanctuary.

In Monroe County, this species is found only on the mainland (Hodges and Bradley 2006). Hodges and Bradley (2006) stated that if it had occurred in the Florida Keys, the most likely locations would have been pine rocklands on Key Largo, Big Pine Key, Cudjoe Key or Lower Sugarloaf Key, all of which were surveyed for this species. Hodges and Bradley indicated most of the sites on Key Largo have been developed. There have been no records of this taxon ever being collected there.

Everglades bully appears to have a much wider range than previously thought (Gann et al. 2006). The current range of Everglades bully includes BCNP, the Long Pine Key region of ENP, and pine rocklands adjacent to ENP (Gann 2015). One population occurs locally at BCNP along the edges of Gum Slough within Lostman's Pines area (south of Loop Road), on the mainland portion of Monroe County (Bradley et al. 2013). The largest population is at Long Pine Key within ENP in Miami-Dade County (Hodges and Bradley 2006; Gann et al. 2006). New occurrences within ENP are expected to be found as work continues to establish the limits of this species' habitat requirements.

One occurrence is located at Larry and Penny Thompson Park in the Richmond Pinelands adjacent to the Metro zoo (aka Miami-Dade County Zoological Park and Gardens) in Miami-Dade County (Gann et al. 2002; Possley and McSweeny 2005). In 2007, Bradley pers. comm. (2007) reported small occurrences in Miami-Dade County at the Lucille Hammock and South Dade Wetlands areas. Possley (J. Possley, pers. comm. 2011a) found two plants at Quail Roost Pineland, an area that was formerly very overgrown, but was manually treated for hardwood reduction in 2007 and then burned in 2009. Additionally, Possley (pers. comm. 2011b) reported populations from Navy Wells Pineland Preserve (four plants) and Sunny Palms Pinelands (two plants), both areas are Miami-Dade County conservation lands.

Florida pineland crabgrass

The Service first recognized Florida pineland crabgrass as a candidate species on September 27, 1985 (50 FR 39526). The 1990 Candidate Notice of Review (CNOR) published in the Federal Register on February 21, 1990 (55 FR 6184) included Florida pineland crabgrass as a candidate for listing under the Act. At that time, it was determined that listing was warranted, but precluded due to workloads and competing priorities. Florida pineland crabgrass remained on the candidate list as published in the CNOR in 1993 (58 FR 51144, September 30, 1993). The CNOR did not publish again until October 25, 1999, retaining Florida pineland crabgrass as a candidate and assigned a listing priority number of 12. Throughout this timeframe the Service had worked closely with scientific experts, land managers, and stakeholders to implement actions that will help ensure survival and long-term recovery of the subspecies.

Florida pineland crabgrass was listed as a threatened plant under the ESA on October 6, 2017 (82 FR 46691).

Florida pineland crabgrass is listed on the State of Florida's Regulated Plant Index as endangered under Chapter 5B-40, Florida Administrative Code. The Regulated Plant Index also includes all federally listed endangered and threatened plant species. This listing provides little or no habitat

protection beyond the State's Development of Regional Impact process, which discloses impacts from projects, but provides no regulatory protection for State-listed plants on private lands.

Critical habitat has not been designated for this species.

Species description

Florida pineland crabgrass is a small perennial clump-grass, appearing blue-green to gray with reddish-brown stems, typically 0.5-1 m (1.5-3 ft) tall (Small 1933). The leaves form a subtle zig-zag pattern as the leaf blades come off the stem at an angle. The leaf blades are 7-18 cm (2.8 - 7.1) in) long; 1.0-2.2 millimeter (mm) (0.04-0.08 in) wide, and number 2-8 per stem. Both the lower and upper surface and stems are hairy but become glabrous (smooth or hairless) with age. The nodes are mostly glabrous, the sheath auricles (an ear-like projection at the base of the leaf) are1.5 mm (0.06 in) long, and the sheaths are hairy but becoming glabrous with age. The ligule (a small bract located at the leaf-stem junction) is 1.5-2.0 mm (0.06-0.08 in) long. The flowers are dull green, very small, and are borne on wispy spikes on the ends of the leafy stems, with usually only a few flower clusters forming per clump of grass. The lemma (a tiny bract adjacent to the flower) of upper floret (flower) is purple. Stolons (aboveground horizontal stems) are not present, but the plant produces rhizomes (belowground horizontal stems) that allow for vegetative spread (Webster and Hatch, 1990); however, inflorescence branches have been known to produce roots infrequently at their nodes, and these have been observed producing new ramets (belowground horizontal stems) that allow for vegetative spread (Fellows *et al*. 2003; Lange, pers. comm. 2016). Florida pineland crabgrass is known to reproduce sexually (Bradley and Gann 1999), with fruit production in the fall (Wendelberger and Maschinski 2006).

Taxonomy

Digitaria pauciflora was first described in 1928 based on specimens collected in 1903 (Bradley and Gann 1999). Small (1933) later placed it in the genus *Syntherisma*. Subsequent authors (Webster & Hatch 1990) have retained it in the genus *Digitaria* (Bradley and Gann 1999). *D. pauciflora* was absent from collections from 1939 until 1973, when it was rediscovered in ENP (Bradley and Gann 1999).

The online Atlas of Florida Vascular Plants uses the name *Digitaria pauciflora* (Wunderlin and Hansen 2008), the Integrated Taxonomic System (ITIS 2016), NatureServe (2016), and the Florida Department of Agriculture and Consumer Services (FDACS) (Coile and Garland 2003) indicates that its taxonomic status is accepted. We have carefully reviewed all taxonomic data to determine that *Digitaria pauciflora* is a valid taxon. The only synonym is *Syntherisma pauciflora* (Hitchcock) Hitchcock ex Small (ITIS 2016).

Life history

Little is known about the life history of Florida pineland crabgrass, including pollination biology, seed production, or dispersal. Reproduction is sexual, with new plants generated from seeds (Bradley and Gann, 1999). The species produces flowers from summer to late fall on both new and older growth, some plants have been observed to finish seeding as late as December (Fellows *et al*. 2002; Gann 2015). Plants can also spread clonally via rhizomes (Webster and Hatch, 1990). The plants can stand partial inundation with fresh water for a portion of the year, but do not tolerate salinity.

Fairchild Tropical Botanic Garden (FTBG) has provided 16,908 Florida pineland crabgrass seeds (from within ENP) to the National Center for Genetic Resources Preservation (NCGRP) for use in *ex situ* conservation and ecological studies (Lange [Fairchild Tropical Botanic Gardens], pers. comm. 2016).

Florida pineland crabgrass population demographics or longevity have not been studied (Bradley and Gann, 1999; Fellows *et al*. 2002). There have been no studies of the plant's relationship to fire; however, periodic fire is extremely important to maintaining habitat for this species (Bradley and Gann, 1999; ENP 2014). Therefore, historical declines have been partially attributed to habitat loss from fire suppression or inadequate fire management. Gann (2015) indicates that the species shows patch dynamics, colonizing new areas and undergoing local extinctions with high rates of turnover. Plants with 'flashy' or 'boom and bust' demographic patterns are more susceptible to stochastic extinction events. ENP has burned populations of Florida pineland crabgrass during the wet and dry season, and both appear suitable to maintain populations of the plant (ENP 2014).

Habitat

Florida pineland crabgrass occurs predominantly within the seasonally flooded ecotone between pine rockland and marl prairie, although the species may overlap somewhat into both habitats (Bradley and Gann 1999; Fellows *et al*. 2002). Plants can withstand inundation with fresh water for one to several months each year (ENP 2014). These habitats are maintained by regular fire, and are prone, particularly marl prairie, to annual flooding for several months during the wet season (Gann *et al*. 2006).

Status and Distribution

Historical Range

All known historical and current records for Florida pineland crabgrass are summarized in Table 1. The historical range of Florida pineland crabgrass consists of central and southern Miami-Dade County along the Miami Rock Ridge, from the southern Miami to Long Pine Key region of ENP, a range of approximately 42 mi (67.6 km) (Bradley and Gann 1999). Specimens of Florida pineland crabgrass were collected early in the twentieth century throughout Miami-Dade County. The plant then went unreported for several decades before being rediscovered at Long Pine Key in 1973. Florida pineland crabgrass has subsequently been encountered consistently within Long Pine Key (Gann 2015).

A single Florida pineland crabgrass plant was discovered in 1995 within marl prairie habitat at the Martinez Pinelands in the Richmond Pine Rocklands, an area of Miami-Dade County that retains the largest contiguous areas of pine rockland habitat outside of the Everglades. However, this plant has since disappeared (Herndon 1998; Bradley and Gann 1999; Gann 2015). Three other historical occurrences in Miami-Dade County have been documented: (1) a site between Cutler and Longview Camp (last observed in 1903); (2) Jenkins Homestead (date unspecified); and, (3) South Miami (last observed in 1939) (Bradley [Institute of Regional Conservation], pers. comm. 2007), however little is known regarding the status of these populations. The species was

not found during a 2-year project to survey and map rare and exotic plants along Florida Department of Transportation (FDOT) rights-of-way within Miami-Dade and Monroe counties (Gordon *et al*. 2007).

Current Range

The current range of Florida pineland crabgrass includes ENP and BCNP (Bradley and Gann 1999; Gann *et al*. 2006; Gann 2015). Ongoing surveys suggest the species occurs throughout Long Pine Key of ENP (Gann *et al*. 2006; Gann 2015) and is much wider ranging than previously known in ENP. Recent surveys of the species within ENP (Maschinski and Lange 2015) and BCNP (Bradley *et al*. 2013) characterize these populations as abundant.

Big Cypress National Preserve - In 2002, Bradley *et al*. (2013) discovered Florida pineland crabgrass within the Lostmans Pines region of BCNP in Monroe County. This represented the first known Florida pineland crabgrass occurrence outside Miami-Dade County (FNAI 2007). The species is widely distributed within Lostmans Pines (Bradley *et al*. 2013). Subsequent surveys for the species within BCNP have documented up to nine occurrences, some of which contain an estimated 500-600 plants (Maschinski *et al*. 2003). Bradley *et al*. (2013) conducted surveys in the Gum Slough region of Lostmans Pines and indicated that the species is widely distributed within the study area. A total of 2,365 plants were counted within pineland and sawgrass-based survey plots (Bradley *et al*. 2013).

Everglades National Park - The population estimate for Florida pineland crabgrass is greater than 200,000 individuals at Long Pine Key (Gann 2015; Maschinski and Lange 2015). Large-scale stochastic events such as wildfire and flooding can drastically reduce the size of Florida pineland crabgrass populations. For example, in the spring months of 2016, wildfires in areas occupied Florida pineland crabgrass likely reduced populations in ENP. The populations will likely rebound; however, regeneration could be severely hampered, based on the amount and duration of flooding during the region's late summer storm season.

The range-wide population estimate for Florida pineland crabgrass is greater than 200,000 individuals at Long Pine Key (Gann 2015; Maschinski and Lange 2015) and greater than 10,000 individuals within BCNP (Bradley, pers. comm. 2007). While Florida pineland crabgrass populations remain abundant within ENP and BCNP, these areas represent only half of the species' historical range (Bradley and Gann 1999; Gann 2015). While Florida pineland crabgrass was known to occur throughout Miami-Dade County, all other populations are likely extirpated.

Florida prairie-clover

Florida prairie-clover was federally listed as endangered under the ESA in October 2017. The following discussion is summarized from the most recent species assessment (Service 2012c) and from recent research publications and monitoring reports.

Species description

Florida prairie-clover is a short-lived (less than 7 years) perennial shrub endemic to southern Florida. This species typically grows to 2.6–9.8 ft (0.8–3.0 m) tall and has a light-brown woody

stem and non-woody, light-brown or reddish branches. The leaves are composed of 9 to 15 oval, gland-tipped leaflets, and are gland-dotted on the underside. The flowers are in small loose heads at ends of hairy, glandular stalks, less than 0.4 in long. The flower color is white and maroon; each of the petals is different length and shape. The fruit is a small one-seeded pod, mostly enclosed by the hairy, gland-dotted calyx (bracts at base of each flower) (adapted from Long and Lakela 1971; Bradley and Gann 1999; Maschinski et al. 2014).

Life history

Florida prairie-clover *is* a short-lived (less than 7 years) perennial with a persistent seed bank (Maschinski et al. 2014). The species produces flowers from October to March, and fruit ripen from November to April. The seed maturation period is January to May, with a peak in February and March. Larger plants can produce more than 500 seeds. Seedling recruitment varies widely from year to year, with lower recruitment in drier years. Seedlings and juveniles experience rapid growth in their first 2 years (Maschinski et al. 2014). The plants can stand partial inundation with fresh water for a portion of the year, but do not tolerate salinity.

Population dynamics

The historical range of Florida prairie-clover includes Miami-Dade, Monroe, Collier, and Palm Beach counties (Gann et al. 2015). There have been no reports of this plant from Palm Beach County since 1918 (Bradley and Gann 1999). In Miami-Dade County, the species has been extirpated from a number of historical locations, including Castellow Hammock, the Coral Gables area, pinelands south of the Miami River, and Cox Hammock (Bradley and Gann 1999; Maschinski et al. 2014). Gann et al. (2002) accounted for essentially every herbarium specimen and reliable sighting.

Florida prairie-clover grows in pine rockland, rockland hammock, marl prairie, coastal berm, and in the ecotones between these habitats (Bradley and Gann 1999). The species also occur along roadsides within these habitats (Gann et al. 2006).

Roadsides

Roadsides are a potentially important habitat for Florida prairie-clover (Bradley and Gann 1999). Where endemics such as Florida prairie-clover are found on shoulders, the ground cover is dominated mostly by native herbs and grasses where exotic lawn grasses have not been planted. Maintaining roadsides in this condition through regular mowing and without planting sod, should continue to provide suitable habitat for Florida prairie-clover (Bradley 2006).

Fire ecology and demography

There have been no studies of Florida prairie-clover's relationship to fire; however, periodic fire is extremely important to maintaining habitat for this species (Maschinski et al. 2014). Therefore, historical declines have been partially attributed to habitat loss resulting from fire suppression or inadequate fire management.

Status and distribution

The current range of Florida prairie-clover includes Monroe, Collier, and Miami-Dade counties. There are three Miami-Dade County conservation areas, and three unprotected lands within the

Cutler Bay region of Miami-Dade County where the species is found (Maschinski et al. 2014). In 1999, Florida prairie-clover was rediscovered within BCNP (Bradley and Gann 1999).

Maschinski et al. (2014) subsequently surveyed the four extant Florida prairie-clover populations on BCNP, finding them at two locations. An area north of Oasis Visitor Center contained 236 plants of various ages and represents the largest extant population within BCNP. The second extant population was in the Pinecrest region (along Loop Road) of BCNP, an historic location within ENP; however, only 17 plants were encountered. The species was not found at 11-Mile Road, or at a second location along Loop Road during the surveys.

Maschinski et al. (2014) have extensively surveyed extant Florida prairie-clover populations at Charles Deering Estate, R. Hardy Matheson Preserve, and Crandon Park within Miami-Dade County from 2004 to 2014. During 2003 to 2007, the population at Charles Deering Estate ranged from between 50 and 80 individuals, with the number of seedlings ranging from 3 to 54. However, beginning in 2008, Maschinski et al. (2014) have documented pulses in seedling establishment. In 2010, the total population size (seedlings and woody plants) was 356 individuals. The majority of these were seedlings and basal re-sprouts from a fire that affected approximately one-third of the population (Maschinski et al. 2010). A 2014 survey found 347 plants, suggesting the population remains stable (Maschinski et al. 2015).

The population at R. Hardy Matheson Preserve had declined from 31 plants in 2004 to just 1 woody plant and 3 seedlings in 2008. However, the population increased to 330 and 200 seedlings in 2009 and 2010, respectively. The most recent surveys indicated stable populations of 98 and 307 individuals, in 2014 and 2015, respectively (Maschinski et al. 2015).

In 2003, Florida prairie-clover was discovered within coastal uplands at Crandon Park for the first time since 1966 (Maschinski et al. 2010). The population at Crandon Park appears to be stable; however, it is highly localized to a small area of approximately 145 square-m (Possley and Maschinski 2009). During 2007, Fairchild Tropical Botanic Garden initiated a demographic study of the species. Sampling plots found 200 plants of various sizes, resulting in a population estimate of 966 plants at the site (J. Maschinski, pers. comm. 2007; Possley and Maschinski 2009). Subsequent surveys have shown the population to vary considerably, possibly due to a short lifespan or plant dormancy (Possley and Maschinski 2009). Surveys at Crandon Park identified 288 and 168 individuals, in 2014 and 2015, respectively (Maschinski et al. 2015). Additional known populations within Miami-Dade County on privately owned land are summarized in the Service's Proposed Rule (Service, 2012b).

Within ENP, Florida prairie-clover is currently known from a single isolated patch of pine rockland habitat and along the roadside at Mahogany Hammock Road. The first known report of this occurrence was in 2018 but the location may have been known to park users as early as 1988. Following the report, park staff surveyed the roadside and adjacent pine rockland and estimated that 100 individuals were present. Surveys were also made of the entire roadside and parking area at Mahogany Hammock Road and in similar habitat in the immediate vicinity of this reported location. No additional individuals of Florida prairie clover were located. Florida prairie clover was also collected in East Everglades, presumably in the vicinity of Context Road, in 1964. Numerous surveys in that area have

failed to relocate plants and that population is considered extirpated. Based on the plant communities present in East Everglades, that occurrence was likely within a disturbed area or a rockland hammock.

Prior to the report of the occurrence along Mahogany Hammock Road, ENP maintained the area as a mowed roadside in the manner frequency described for routine vegetation maintenance. Following the report, ENP stopped routinely mowing the portion of the roadside where plants were found. Between 2018 and 2020, the roadside has been mowed on 2 occasions. Following each mowing, plants in the mowed area resprouted from woody bases. However, overall effects of the mowing, particularly on small individuals, are not known. It is likely that some mortality occurs from the direct effect of the mowing and from accumulations of mowed vegetation covering some plants. Based on the previous and recent maintenance history of this site, it appears that plants are capable of persisting in this area with periodic mowing. It is possible that the maintenance of low, open vegetation is the reason that plants are able to occupy this site.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the ESA (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in progress. The environmental baseline defines the status of the species and its habitat in the Action Area to provide a platform to assess the effects of the action now under consultation.

American crocodile

Status of the Species and within the Action Area

Crocodile nesting is known to occur within several developed areas in the Flamingo District, including along Main Park Road, in the Flamingo Maintenance Yard, West Lake, Flamingo Campgrounds and Lodging, and around the Flamingo Visitor Center. Additionally, undetected nests may occur on the higher and dryer portions of maintained roadside vegetation near water. Sites within the Flamingo District including the Main Park Road, Flamingo Housing Area, the Flamingo Camping and Lodging areas, and the Concessions maintained areas are in the vicinity of sandy shorelines.

Factors affecting the species environment within the Action Area

As discussed previously in the Range Wide Status of the Species section of this BO, the burgeoning human population in south Florida has significantly impacted the American crocodile in south Florida. Human activities have resulted in loss and modification of crocodile habitat, disturbance, and direct mortality to crocodiles (e.g., historical hunting, collisions with automobiles).

Alteration of Hydrology, Salinity, and Water Quality

Anthropogenic activities instituted in the twentieth century to promote human settlement and development in central and south Florida have appreciably altered coastal aquatic habitats used by American crocodiles. The most important of these activities was the Central and Southern Florida Project, (C&SF Project), authorized by congress in 1948. The goals of this project were: flood control; the establishment of a water supply for municipal, industrial and agricultural users; the prevention of saltwater intrusion; the establishment of a water supply for ENP; and paradoxically, the protection of fish and wildlife resources. Upon completion of the C&SF Project, approximately 1,000 mi (mi) of levees, 720 mi of canals and nearly 200 water control structures were constructed in central and south Florida.

Although construction of the project achieved its intended purpose with respect to development, water management, flood control, and human expansion, it had significant adverse effects on the hydrology and natural ecosystems of the Everglades and Florida Bay, including those areas that provide habitat for the American crocodile. Prior to construction of the C&SF Project, rainwater runoff from the Kissimmee Valley in central Florida flowed slowly south through Lake Okeechobee and the Everglades before emptying into Florida Bay. Following construction, water conservation and storage, and flood protection became the primary use for Everglades wetlands located north of the ENP. This resulted in drastic changes in timing, quality, and quantity of freshwater delivered to coastal areas including Florida Bay. The quantity of freshwater that reaches southern coastal areas has been significantly diminished. Moreover, the presence of canals constructed in association with the C&SF allowed intrusion of salt-water into ENP wetlands. As such, salinities within adjacent coastal wetlands have increased.

Increased salinity in the waters of Florida Bay's estuarine wetlands has adversely affected the American crocodile. Salinity can affect crocodiles directly by influencing hatchling survival and habitat selection by all size classes, or indirectly by influencing food availability, thereby affecting growth, survival, and reproduction. Growth, survival, and reproduction are factors that influence the rate and direction of population change for the species.

Although, not the primary cause of the historic decline of the American crocodile in Florida, changes in salinity resulting from construction of the C&SF project likely accelerated the reduction of the population. Moreover, increased salinity in Florida Bay coastal wetlands due to the altered hydrologic regime continues to limit the growth of the crocodile population and affect the recovery and viability of the Distinct Population Segment of the American crocodile in Florida. The construction and implementation of the CERP is expected to enhance the delivery of freshwater into coastal wetlands and Florida Bay, reduce salinity, and improve ecological conditions for crocodiles. These changes are anticipated to increase the growth, body condition, reproduction, and survival of crocodiles, and ultimately increase the crocodile population.

Human activities can result in the degradation of the water quality of the aquatic habitats used by the American crocodile. This is especially true in urban and agricultural areas where rainwater runoff has increased the levels of nutrients such as nitrogen and phosphorous. The effects of reduced water quality due to increased nutrients on the crocodile population are unclear. Small increases in aquatic nutrients may benefit crocodiles by increasing the amount of prey available. Conversely, it could result in crocodiles concentrating in areas closer to human habitations

because of the increased availability of food, and increase the likelihood of negative human-crocodile interactions. Excessive levels of nutrients that may occur during runoff from heavy precipitation events can result in the overgrowth of algae. When the algae die, the decay process lowers the level of dissolved oxygen in the water and ultimately can kill fish and other aquatic organisms used as prey by crocodiles, thus having a detrimental effect on the crocodile population.

Illegal Hunting and Indiscriminate Killing

Historically, the illegal killing of American crocodiles by humans contributed to the species decline (Service 1981). Crocodiles were shot indiscriminately for sport, killed due to human intolerance or fear of a large predator, or poached for their skins which are used to produce and sell leather goods. Ogden (1978) suggested that the activities of people were the most important regulating factor on crocodiles with shooting and disturbance of animals at nest sites reducing the population. Prior to listing, laws and regulations protecting the American crocodile did not exist. That changed when the American crocodile was federally listed under the ESA in 1975. Subsequently, the State of Florida also listed the American crocodile as a threatened species. Further, the Florida population of American crocodiles is listed under Appendix 1 of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES; see section 4.10). The law enforcement sections of the Florida Fish and Wildlife Conservation Commission (FWC), NPS, and Service now provide enforcement of laws pertaining to the American crocodile. Currently, there seems to be adequate regulatory mechanisms in place, including law enforcement presence, to protect the American crocodile from illegal hunting or poaching, and it is not currently deemed a significant threat to the species. Nonetheless, the indiscriminate killing of American crocodiles occasionally occurs.

The Service is aware of 17 crocodiles that were illegally killed by humans from January 1, 1975 through April 30, 2019. Eleven of these animals were killed by gunshots, 2 died after ingesting a baited hook on a setline, 1 was killed with a knife, 1 died from punctures due to an unknown weapon, and another was beaten to death by a group of people. In addition, a small crocodile died in an incident where it was likely stabbed after being intentionally hooked with a fishing lure (Ford 2019).

The Service has also documented two incidents where humans attempted to kill or injure American crocodiles but were not successful. In November 2017, a man was observed firing at least 12 gunshots at a crocodile swimming in a canal in Islamorada, Florida. The man was subsequently arrested and indicated that the shooting was retribution for the crocodile's suspected killing of pets in the area. The crocodile survived the incident and was later observed with a wound in its tail that was consistent with being shot by a handgun. In June 2013, a bait consisting of several turkey legs and a beef tongue, interspersed with 20 to 30 fishing hooks and bound together with twine, was found floating in a section of Little Card Sound where crocodiles are known to occur. The floating bait did not harm a crocodile but was thought to be an attempt to kill a crocodile in connection with the animal sacrifice practices associated with the Santeria religion (Dixon 2013).

In most of the incidents described above, the reasons for the illegal killing of American crocodiles by humans, appears to be fear, intolerance or hatred of the species. In only one case

was the crocodile specifically killed for its meat, because its tail was cut off and this practice is commonly observed when American alligators are poached for meat. There was no evidence indicating that any of the crocodiles killed were being poached for their skins.

Based on the 17 crocodiles that were killed by humans from January 1975 through April 2019, we calculate the yearly mortality rate of American crocodiles resulting from illegal killing as 0.39 crocodiles per year. Consequently, mortality resulting from illegal killings is negligible, and does not appear to be significantly reducing the population of American crocodiles in Florida at this time.

Road-related Mortality

Roads and highways represent a potential threat to the American crocodile because individuals venturing onto roadways can be injured or killed due to collisions with motor vehicles. The growth of the human population in south Florida has increased the number of motor vehicles on existing roadways and necessitated the widening of existing roads and the building of new roads that occur in and adjacent to crocodile habitat. Consequently, the potential for injuries and mortalities of crocodiles due to motor vehicle collisions has increased considerably since the time of listing. Reports from the FWC and records from other sources indicate that at least 111 American crocodiles were killed and 3 were injured due to collisions with motor vehicles from January 1,1975 through April 30, 2019 on roadways in south Florida. The actual number of road-related crocodile mortalities in Florida may be slightly higher because the mortalities of smaller crocodiles (i.e., hatchlings and juveniles), or individuals who are injured and crawl away from the road before dying, are less likely to be detected and may go unreported. Crocodile mortality due to vehicle collisions occurred at a rate of approximately 2.5 deaths per year over this time period. When road-related mortality is considered in 10-year increments, the annual mortality rate appears to be increasing slightly since listing. Approximately 1.5 crocodiles were killed per year from 1975 through 1984, 2.1 from 1985 through 1994, 3.3 from 1995 through 2004, and 2.9 from 2005 through 2014. The annual vehicle-related mortality rate of crocodiles from January 1, 2015 to April 30, 2019 is 3.0 deaths per year.

Roadway underpasses have been employed to reduce the likelihood that crocodiles will be injured or killed due to collisions with motor vehicles. Road-related mortality of crocodiles had been an ongoing problem on the segment of U.S. Highway 1 from south of Florida City to Key Largo in Miami-Dade and Monroe counties where wetlands providing habitat for crocodiles are located on both sides of the roadway (Service 1999; Mazzotti 1983; Moler 1991). The Florida Department of Transportation (FDOT) reduced vehicle-related crocodile mortality along this section of U.S. Highway 1 by installing a series of 16 wildlife underpasses consisting of large culverts and barrier fencing in association with planned improvements to the roadway that were completed in 2011. Initially, the entire west side of the roadway was fenced, and wing-fences about 100 ft long were installed along the east side of the road at each of the culvert locations. Because crocodiles could still access the roadway, the FDOT agreed to fence the entire eastern side of the roadway based on a request from the Service and that work was completed a few years later. Currently, the FDOT conducts ongoing inspections and maintenance of the fence to ensure that it continues to function properly.

Mazzotti and Cherkiss (2003) stated that collisions with automobiles continue to the major documented cause of mortality of crocodiles in Florida. Even though the rate of crocodile mortalities due to vehicle collisions appears to have increased slightly since listing, our data suggest that it is currently only a small portion of annual crocodile mortality (i.e., 2 to 3 deaths per year in a population at 933 to 2,333 individuals). In addition, the installation of underpasses and barrier fencing along U.S. Highway 1, as described above, has helped to reduce the potential for injuries and deaths of crocodiles due to vehicle collisions. Road-related mortality does not appear to be limiting the crocodile population at this time. However, it could become a greater threat if currently elevated areas that provide nesting habitat are lost to sea level rise, erosion, or development, and crocodiles begin to use elevated roadbeds for nesting.

Interactions Between Humans and Crocodiles

American crocodiles represent a potential threat to humans because they are predaceous in habit, have strong jaws with many sharp conical shaped teeth, grow to lengths of 13 to 15 ft or larger, and are physically capable of injuring or killing a human. Because other species of crocodiles have been known to attack humans, American crocodiles in Florida are perceived by some laypersons as dangerously aggressive and a significant threat to human safety. Conversely, many who study the species consider it to be shy and reclusive, and less dangerous to people than American alligators. Existing data from Florida seem to support the latter interpretation. There has been only one confirmed case of an American crocodile attacking a human in Florida. Bites from this non-fatal attack resulted in minor injuries and the attack occurred when two people decided to swim in a canal at night known to be inhabited by crocodiles. Nonetheless, incidents of American crocodiles attacking or killing dogs in Florida have been recorded. Moreover, attacks on humans by American crocodiles resulting in human injury or mortality have been documented in other countries within the American crocodile's range. These incidents usually involved large adult crocodiles (> 9 ft in total length) and persons swimming or standing in water. In a few cases, sub-adult or juvenile animals (i.e., those < 6 ft in total length) bit humans, although these bites only resulted in minor injuries (Croc BITE database: http://www.crocodile-attack.info).

Annually, the FWC receives many complaints from the public regarding observations of or encounters with the American crocodile. Complaints originate primarily from persons in Miami-Dade County and the Florida Keys in Monroe County. However, complaints are received from anywhere in southern Florida within the range of the American crocodile. Most of the complaints relate to observations of American crocodiles in residential areas, and the complainant usually expresses fear of the crocodile's presence and request action to eliminate the perceived problem. The numbers of crocodile-related complaints received by the FWC has increased in recent years with a record number of 240 received from September 2017 through August 2018. However, the views of the complainants toward American crocodiles may not represent the sentiments of the majority of the public. A survey of south Florida residents and visitors (n = 249) conducted by Smithem and Mazzotti (2008) suggest that only a small proportion of the public believe they are personally at risk due to the presence of crocodiles. The majority of respondents in that survey did not consider crocodiles an unacceptable threat to humans or pets, and nearly half thought crocodiles should have the right to exist wherever they may occur.

Exotic Species
Historically, a number of non-native plant and animal species have been intentionally and unintentionally introduced to the state of Florida and the rate of introductions has increased significantly within the last century. At least 277 exotic plant species have invaded pine rocklands throughout South Florida (Service 1999b), and 192 non-native animal species (Ferriter et al. 2009) were established in the state as of 2009. Many of these species are innocuous, but in some cases, introduced species have severely altered native ecosystems and reduced native wildlife populations. Below, we discuss the exotic invasive plant and animal species that represent the greatest threat to the survival and recovery of the American crocodile.

Exotic Plants
Three exotic plant species, Australian pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolius*), and melaleuca or cajeput tree (*Melaleuca quinquenervia*) have altered thousands of acres of wildlife habitat in south Florida and currently provide the greatest threat to the crocodile's habitat. All are woody trees or subtrees. Australian pine and Brazilian pepper generally prefer, and exhibit greater survival on well-drained sites, whereas melaleuca invades a variety of upland and wetland habitat types. All of these species aggressively invade coastal areas and can grow on sandy beaches and berms that provide potential nesting habitat for crocodiles (especially those scarified or otherwise disturbed by human) and form thick impenetrable stands that crowd out native vegetation, and change the character of the habitat from open and sparsely vegetated to thickly wooded and overgrown. The establishment of any of these species within potential crocodile nesting habitat usurps nesting sites and can render the area unsuitable for crocodile nesting. One or more of these species are known to occur at important nesting sites for crocodiles in south Florida including the Action Area in ENP.

Treatment and management of these exotic plant species is necessary to maintain suitable habitat for the American crocodile throughout much of its range. Currently, the most effective treatment to control these invasive species consists of mechanical removal and the use of herbicides. Ongoing management of exotic plants is currently occurring on Federal and state lands throughout the American crocodile's range in Florida including the Action Area in ENP.

Exotic Animals
Two recently established exotic animal species, the Burmese python (*Python bivittatus*) and the Argentine black and white tegu (*Salvator merianae = Tupinambis merianae*; tegu), have the potential for being significant predators of American crocodiles. The Burmese python is a large constrictor snake, up to 23 ft (7 m) in total length (Harvey et. al 2008), and native to southeast Asia. The tegu is a medium size (2 to 3 ft [0.6 to 0.9 m] in total length), heavily bodied lizard, native to South America. The size of the Burmese python and tegu populations in south Florida are not known, but the former has been estimated to number in the thousands (Snow 2007). Burmese pythons have been documented to feed on a variety of animal species in Florida, including the American alligator. Although predation of crocodiles has not yet been documented, Burmese pythons are certainly capable of killing and consuming hatchling, juvenile, and sub-adult crocodiles. The tegu is known to eat reptile eggs and has been photographed by motion sensitive cameras consuming American alligator eggs and loitering at a crocodile nest site (Mazzotti et al. 2014b). Both of these exotic species have been documented to occur in or near the CCS at the TPPP and are known to occur within the Action Area (Dean

personal communication 2021a). Predation of crocodiles and competition with crocodiles by Burmese pythons and egg predation by tegus could significantly reduce the current crocodile population, and potentially affect the survival and recovery of the species. The FWC has conducted a monitoring, capture, and eradication programs for the tegu in south Florida near Homestead and captured and euthanized more than 400 tegus. FPL has also agreed to monitor and trap tegus in their Everglades mitigation bank located adjacent to the CCS at their TPPP. The FWC has also organized public python hunts within south Florida to help control this exotic species.

The green iguana, native to central and South America, is another exotic reptile species established in Florida and could become a potential threat to the American crocodile. The population of green iguanas in south Florida has significantly increased in recent years and now iguanas commonly occur in areas inhabited by crocodiles. Iguanas have been observed digging up American crocodile nests in Panama when attempting to lay their eggs, exposing crocodile eggs in the process (Dugan et al. 1981). Uncovering eggs following deposition in the nest results in mortality of at least some and potentially all of the eggs in the nest due to exposure to the elements. It also increases the likelihood that predators will find the eggs and eat them. Mazzotti (2019 personal communication) stated that a green iguana was observed digging into an American crocodile nest in ENP. In addition, diggings from iguanas are commonly observed in and around crocodile nests at the Crocodile Lake National Wildlife Refuge (Dixon 2019 personal communication).

Conservation Efforts

Nevertheless, a variety of conservation efforts have been undertaken in south Florida, including within the Action Area to protect crocodile habitat and benefit crocodiles. In 1944, congress authorized the establishment of ENP, and a crocodile sanctuary was established in ENP at northeastern Florida Bay in 1980. The implementation of the CERP is also expected to benefit the American crocodile. The historic hydrology of the Everglades has been substantially altered resulting in adverse impacts to the health of estuarine environments in south Florida. Historic alterations to the Everglades ecosystem are also believed to have adversely affected the crocodile population (Service 1999). The numerous hydrologic projects associated with the CERP are currently in various stages of planning and implementation. These projects are expected to improve habitat conditions for crocodiles by decreasing salinities in Florida Bay. This will be accomplished by increasing the volume of freshwater and improving the timing of freshwater delivered to Florida Bay and Shark River Slough.

Past and ongoing restoration and management activities conducted on public lands have enhanced and renewed habitat for the American crocodile. The NPS addressed saltwater intrusion in portions of the coastal wetlands of the ENP by installing plugs in the Homestead, Buttonwood, and East Cape canals in the early 1980s. These actions lowered the salinity of the waters located north of the plugs, and crocodiles responded by nesting on the berms along the canals (Mazzotti and Cherkiss 2003).

Everglades bully

Status of the Species within the Action Area

In ENP, the Everglades bully is locally common in appropriate habitats throughout the Long Pine Key area within Fire Management Unit (FMU) 3. Plants have been recorded in marl prairie and wet pine rocklands at 11 locations. Surveys did not include habitats in the western pine blocks or the Pine Island area. However, it is likely additional plants would be found in these areas if surveys were conducted. The population size of this species in ENP is estimated to be between 10,000 and 100,000 plants (Gann et al. 2008). Due to the widespread distribution and abundance, ENP staff do not typically record site-specific information for this species when conducting rare plant surveys. Although quantitative information is lacking, qualitative observations throughout the range within ENP indicate the population is currently stable.

Factors affecting the species environment within the Action Area

The Miami-Dade County pine rocklands have largely been destroyed by residential, commercial, and urban development, and agriculture. By the mid-1990s, pine rocklands in the county (including patches of marl prairie) had been reduced to about 11 percent of their former extent (Kernan and Bradley 1996). Of the estimated historical extent of 74,000 ha (182,780 ac), only 8,140 ha (20,106 ac) of pine rocklands remained in 1996. A decade later, only about two percent (920 ha (2,273 ac)) of the original Miami-Dade County pine rockland (51,192 ha (126,500 acres)) remained outside ENP (URS Corporation Southern et al. 2007). The habitat has continued to decrease due to a variety of causes including development, encroachment of exotic plants, and lack of management.

Everglades bully habitat at Long Pine Key in ENP (e.g., pinelands, pineland/prairie ecotones, and prairies) are, for the most part, protected. The largest population is essentially protected from habitat loss caused by development or agriculture; however, effects from sea level rise, hydrological changes, and other natural and anthropogenic factors may still affect this species despite its protection on public conservation lands.

Climate Change

Climate change and sea level rise are major threats to South Florida, including this species and its habitat. The overall threat of habitat loss from sea-level rise is expected to increase in the future as climate change and sea level rise become more of a factor over the long-term. Everglades bully are found in low elevation pinelands and pineland/marl prairie ecotones that currently flood each summer (wet season) (Gann et al. 2006). Projected sea level rise is expected to inundate these areas for longer periods and may cause these habitats to become unsuitable for Everglades bully.

Fire

Fire is an important feature in maintaining the pine rockland community. Therefore, fire suppression is a significant threat to Everglades bully (Gann et al. 2002). Under natural conditions, lightning fires typically occurred at 3 to 7-year intervals or more frequently in marl prairies. With fire suppression, hardwoods eventually invade pine rocklands and shade out understory species. The suppression of fire has reduced the size of the areas that do burn, and

habitat fragmentation has prevented fire from moving across the landscape in a natural way. Thus, many pine rockland communities are becoming tropical hardwood hammocks.

Exotic Species

Exotic species have altered the type of fire that occurs in pine rocklands. Historically, pine rocklands had an open, low understory where natural fires remained patchy, with relatively low temperatures, thus sparing many native grasses and shrubs. Dense exotic plant growth can create higher temperatures and longer burning periods. Pine rockland plants cannot tolerate these extreme fire conditions. As a result, the native plants may have to be conserved by removing exotics through methods other than burning. One such method, hand chopping followed by spot treatment, is labor intensive and very costly. Pinelands in Miami-Dade County outside of ENP are kept intact only by constant maintenance, including removal of exotic plants such as Burma reed (*Neyraudia reynaudiana*), Brazilian pepper, and others, use of prescribed fires, and prevention or cleanup of dumped trash.

Long Pine Key and BCNP are susceptible to invasive exotic plants such as Burma reed and Old-World climbing fern (*Lygodium microphyllum*), which has spread southward into parts of ENP (Ferriter 2001; Ferriter 2003). The former agricultural lands of the Hole-in-the-Donut adjacent to Long Pine Key are infested by exotics such as Brazilian pepper and common guava (*Psidium guajava*) and are a potential source of seeds of these exotic species. ENP is restoring those former agricultural lands, but invasive exotic plants will continue to be a threat even after this restoration work is completed (J. Sadle, pers. comm. 2010).

Hydrology Alterations

Hydrology is a key ecosystem component that affects rare plant distributions and their viability (Gann et al. 2006). Historically, sheet flow from Shark River Slough and Taylor Slough did not reach the upland portions of Long Pine Key, but during the wet season, increased surface water flow in sloughs generated a rise in groundwater across the region (Gann et al. 2006). As artificial drainage became more widespread, regional groundwater supplies declined. Historical patterns of water flow through Long Pine Key are further confounded by road construction (Gann et al. 2006). Water flow through Long Pine Key was originally concentrated in marl prairies, traversing in a north-south direction; however, construction of Main Park Road bisected Long Pine Key in an east-west direction, thereby impeding sheet flow across Long Pine Key (Gann et al. 2006). Water was either impounded to the north of Main Park Road or diverted around the southern portion of Long Pine Key through Taylor Slough and Shark River Slough (Gann et al. 2006). Research Road may similarly affect the water supply of the southern portions of Long Pine Key (Gann et al. 2006).

Gann et al. (2002) and Herndon (1998) expressed concern that changes to regional water management intended to restore the Everglades could negatively affect the pinelands of Long Pine Key. Gann et al. (2006) stated that if hydrological restoration is successful, groundwater levels will presumably be raised, wet season flows will return to marl prairies, fire intensities will decrease, and growing conditions for rare pineland and hammock plants will improve. Alternatively, implementation of Everglades restoration may also lead to further impoundment of water north of Main Park Road, possible flooding of rare plant populations, and a failure to provide relief to habitats on Long Pine Key that are compartmentalized by Main Park Road and

Research Road and have been impacted from long-term drainage (Gann et al. 2006). At this time, it is not known whether the proposed restoration and associated hydrological modifications will have a positive or negative impact on rare species within ENP, including Everglades bully (Gann et al. 2006).

Everglades bully may be vulnerable to catastrophic events and natural disturbances, such as hurricanes. Hurricanes have impacted Miami-Dade County in the past including Hurricane Andrew in 1992, Hurricanes Katrina, Rita, and Wilma in 2005, and Hurricane Irma in 2017. According to the National Oceanographic and Atmospheric Administration, Miami-Dade County, the Keys, and western Cuba are the most storm-prone areas in the Caribbean, so this threat is expected to continue.

In summary, Everglades bully is vulnerable to a wide array of natural and human factors, including: few and isolated occurrences, restricted range, fire suppression, invasive exotic plants, regional water management changes, and catastrophic events and natural disturbances, such as hurricanes and extreme weather events.

Florida pineland crabgrass

Status of the Species within the Action Area

The current distribution of Everglades pineland crabgrass in ENP is restricted to Long Pine Key within FMU 3. The total population is estimated at 1,000 to 10,000 individuals (Service 2013). Individuals are found in marl prairies and adjacent lower elevation pine rocklands in most of the finger glades bisecting the region. Plants reported from marl prairies near ENP's entrance (George N. Avery, unpublished notes) have not been seen since the 1980s. Observations of plants have also been made in prairies and associated wet pine rocklands east of the Main Park Road near Mahogany Hammock in Pine Block West of A.

ENP periodically conducts surveys for rare plants, including Florida pineland crabgrass, in appropriate habitats within ENP. Data from those surveys including geographic coordinates, estimated population size, reproductive status, and associated plant species are recorded and maintained on an internal database. With the exception of plants near ENP's entrance, which have not been observed for many years, no indication of population declines has been observed. However, short- and long-term population trends are not well understood.

Factors affecting the species environment within the Action Area

Habitat Loss

Habitat loss continues to occur in this species' historical range and most remaining suitable habitat has been negatively altered by human activity. Pine rocklands within Miami-Dade County have largely been eliminated by residential, commercial, and urban development, and agriculture. By the mid-1990s, pine rocklands in the county (including patches of marl prairie) had been reduced to about 11 percent of their former extent (Kernan and Bradley 1996). Of the estimated historical extent of 74,000 ha (182,780 ac), only 8,140 ha (20,106 ac) of pine rocklands remained in 1996. A decade later, only about two percent (920 ha (2,273 ac)) of the original Miami-Dade County pine rockland (51,192 ha (126,500 acres)) remained outside ENP

(URS Corporation Southern et al. 2007). Florida pineland crabgrass habitat at Long Pine Key in ENP (e.g., pineland/prairie ecotones and prairies) (Gann et al. 2006) and Big Cyprus National Preserve are, for the most part, protected. The largest known populations of Florida pineland crabgrass are, therefore, essentially protected from habitat loss caused by development or agriculture. Effects from hydrological changes and other natural and anthropogenic factors, however, may still affect this species.

Climate Change

Climate change and sea level rise are major threats to South Florida, including this species and its habitat. All occurrences are in low-lying areas and will be affected by climate change and rising sea level. The overall threat of habitat loss from sea-level rise is currently low, but is expected to increase in the future.

Fire

Fire maintains the pine rockland community. Under natural conditions, lightning fires typically occurred at 3 to 7-year intervals, or more frequently in marl prairies. With fire suppression, hardwoods eventually invade pine rocklands and shade out Florida pineland crabgrass (Bradley and Gann 1999). Fire suppression outside of ENP has reduced the size of the areas that do burn, and habitat fragmentation has prevented fire from moving across the landscape in a natural way. Thus, many pine rockland communities are becoming tropical hardwood hammocks. While application of prescribed fire is difficult in the urban pine rockland fragments in Miami-Dade County, it is somewhat easier to apply on larger public conservation lands such as ENP. Prescribed fire is actively being used at ENP and now appears to be effective in maintaining populations of Florida pineland crabgrass at Long Pine Key (J. Sadle, pers. comm. 2010). Herndon (1998) had reported a sharp decline in the number of plants in one park location, which he attributed to prescribed fire followed by flooding caused by tropical storm Dennis in 1981. Invasive plants have also significantly affected pine rocklands.

Exotic Species

At least 277 exotic plant species have invaded pine rocklands throughout South Florida (Service 1999b). The most problematic exotic plants in pine rocklands are Brazilian pepper and Burmareed (*Neyraudia reynaudiana*) (Bradley and Gann 1999). Brazilian pepper is also a threat to marl prairies (Bradley and Gann 1999). Bradley and Gann (1999) stated the Florida pineland crabgrass in ENP is threatened by exotic plants. In their study of Long Pine Key, Gann et al. (2006) found four species of exotic nonnative plants growing in association with rare plants: shoebutton (*Ardisia elliptica*), centipede grass (*Eremochloa ophiuroides*), monk orchid (*Oeceoclades maculata*), and Brazilian pepper. Of these, only Brazilian pepper has been observed in the vicinity of Florida pineland crabgrass (J. Sadle, pers. comm. 2010). In 2008, an isolated patch of ten Australian pines were treated in Long Pine Key, Pine Block D. Florida pineland crabgrass either resprouted or recruited to this location after the Australian pine was killed (J. Sadle, pers. comm. 2010).

Long Pine Key is susceptible to invasive exotic plants such as Burmareed and Old-World climbing fern, which have spread southward into parts of ENP (Ferriter 2001, Gann et al. 2002, Ferriter 2003). Old World climbing fern is capable of smothering vegetation and is spreading rapidly in Florida (Ferriter 2001, Volin et al. 2004). In 2000, ENP staff discovered new, but

widespread populations of the Old-World climbing fern in the western coast of ENP (Ferriter 2001). The populations had not been detected in 1999 and are particularly alarming due to their remote location and seemingly rapid establishment and spread (Ferriter 2001). Similarly, Volin et al. (2004) suggested an alarming increase in establishment of this fern across South Florida, particularly in the cypress-dominated wetlands of Big Cypress Swamp. Old World climbing fern has the potential to become uncontrollable, except through biological control. In addition, the former agricultural lands of the Hole-in-the-Donut adjacent to Long Pine Key are infested by invasive plants such as Brazilian pepper and common guava (*Psidium guajava*) and are a potential source of seeds of these invasive species. ENP is restoring those former agricultural lands, but invasive exotic plants will continue to be a threat even after this restoration work is completed (J. Sadle, pers. comm. 2010).

Hydrology Alterations

Hydrology is a key ecosystem component that affects rare plant distributions and their viability (Gann et al. 2006). Historically, sheet flow from Shark River Slough and Taylor Slough did not reach the upland portions of Long Pine Key, but during the wet season increased surface water flow in sloughs generated a rise in groundwater across the region (Gann et al. 2006). However, as artificial drainage became more widespread, regional groundwater supplies declined. Historical patterns of water flow through Long Pine Key are further confounded by road construction (Gann et al. 2006). Water flow through Long Pine Key was originally concentrated in marl prairies, traversing in a north-south direction; however, construction of Main Park Road bisected Long Pine Key in an east-west direction, thereby impeding sheet flow across this area (Gann et al. 2006). Water was either impounded to the north of Main Park Road or diverted around the southern portion of Long Pine Key through Taylor Slough and Shark River Slough (Gann et al. 2006). Research Road may similarly affect the water supply of the southern portions of Long Pine Key (Gann et al. 2006).

Changes to regional water management intended to restore the Everglades could negatively affect the pinelands of Long Pine Key (Herndon 1998, Gann et al. 2002, Gann et al. 2006). Gann et al. (2006) stated if hydrological restoration is successful, groundwater levels will presumably be raised, wet season flows will return to marl prairies, fire intensities will decrease, and growing conditions for rare pineland and hammock plants will improve. Alternatively, implementation of the CERP may also lead to further impoundment of water north of Main Park Road, possible flooding of rare plant populations, and a failure to provide relief to habitats on Long Pine Key that are compartmentalized by Main Park Road and Research Road and have been impacted from long-term drainage (Gann et al. 2006). At this time, it is not known whether the proposed restoration and associated hydrological modifications will have a positive or negative impact on rare species within ENP, including Florida pineland crabgrass (Gann et al. 2006). However, since ENP is only one of two locations known to support this species, it will be important to determine potential impacts and monitor the species and its habitat.

Given the species' narrow range and limited number of occurrences, Florida pineland crabgrass is vulnerable to catastrophic events and natural disturbances, such as hurricanes. Hurricanes have impacted Miami-Dade County in the past including Hurricane Andrew in 1992, Hurricanes Katrina, Rita, and Wilma in 2005, and Hurricane Irma in 2017. According to the National Oceanic and Atmospheric Administration (NOAA), Miami-Dade County, the Keys, and western

Cuba are the most storm-prone areas in the Caribbean, so this threat is expected to continue. Increased sea surface temperatures in association with climate change could increase the frequency, severity, and duration of hurricanes.

In summary, Florida pineland crabgrass is threatened by a wide array of natural and manmade factors. Fire suppression, invasive exotic plants, alterations in hydrology, and catastrophic events all pose a threat to this species. Prescribed fire and exotic species control efforts by ENP will likely be beneficial to this pine rockland/marl prairie dependent species. The response of Florida pineland crabgrass to hydrologic changes associated with Everglades restoration will remain unknown until these projects are fully implemented. The threat from tropical weather events is expected to continue and will likely increase. Given its limited distribution and low number of known occurrences remaining, any one of these factors could have a significant impact on the continued existence of Florida pineland crabgrass. Since few occurrences remain in a restricted range, the overall magnitude of threats is considered high.

Florida prairie-clover

Status of the Species within the Action Area

Within ENP, Florida prairie-clover is currently known from a single isolated patch of pine rockland habitat and along the roadside at Mahogany Hammock Road. The first known report of this occurrence was made to park staff in 2018 but the location may have been known to park users as early as 1988. Following the report, park staff surveyed the roadside and adjacent pine rockland and estimated that 100 individuals were present. Surveys were also made of the entire roadside and parking area at Mahogany Hammock Road and in similar habitat in the immediate vicinity of this reported location. No additional individuals of Florida prairie-clover were located. Florida prairie-clover was also collected in East Everglades, presumably in the vicinity of Context Road, in 1964. Numerous surveys in that area have failed to relocate plants and that population is considered extirpated. Based on the plant communities present in East Everglades, that occurrence was likely within a disturbed area or a rockland hammock.

Factors affecting the species environment within the Action Area

Prior to the report of the occurrence along Mahogany Hammock Road, ENP maintained the area as a mowed roadside in the manner and frequency described for routine vegetation maintenance. Following the report, ENP stopped routinely mowing the portion of the roadside where plants were found. Between 2018 and 2020, the roadside has been mowed on 2 occasions. Following each mowing, plants in the mowed area resprouted from woody bases. However, overall effects of the mowing, particularly on small individuals, are not known. It is likely that some mortality occurs from the direct effect of the mowing and from accumulations of mowed vegetation covering some plants. Based on the previous and recent maintenance history of this site, it appears that plants are capable of persisting in this area with periodic mowing. It is possible that the maintenance of low, open vegetation is the reason that plants are able to occupy this site.

EFFECTS OF THE ACTION

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the

proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

American crocodile

Crocodile nesting is known to occur within several developed areas in the Flamingo District, including along Main Park Road, in the Flamingo Maintenance Yard, West Lake, Flamingo Campgrounds and Lodging Area, and around the Flamingo Visitor Center. Additionally, undetected nests may occur on the higher and dryer portions of maintained roadside vegetation near water (e.g. Bear Lake Road). Sites within the Flamingo District including the Main Park Road, Flamingo Campgrounds and Lodging Areas, and the Concessions maintained areas are in the vicinity of sandy shorelines (ENP 2020). Figure 6 displays an overview of these areas with crocodile nest locations that occurred in these areas from 2005 through 2020.

Expected effects of routine maintenance activities on juvenile and adult American crocodiles are limited to temporary changes in crocodile behavior for the activities occurring outside the nesting season (approximately August through February). It is assumed that larger crocodiles would move out of the way of the mower or the equipment operator would make a detour around the animal.

However, maintenance activities during the nesting season (approximately March through August), in areas of known nesting, may lead to disturbed, destroyed, or abandoned nests. In areas where mowers or other equipment are permitted for maintenance activities, there is the potential for nests to be run over and young to be injured or killed; it is known that some nests successfully hatch from nests laid within mowed roadsides, so nests are not always lost or damaged by mowing or vehicles. However, there is reasonable certainty that the proposed action would result in accidental injury or mortality to crocodile eggs.

As previously stated in the *American Crocodile Life History* section of this BO, crocodiles are oviparous and reproduce by laying eggs in a nest that hatch following an incubation period of approximately 85 to 90 days (Moler 1992). The average clutch size is about 35 eggs (Cherkiss et al. 2020), and crocodile nests are constructed on beaches, stream banks, and levees, and many nest sites are used recurrently. Following egg laying, the female crocodile covers up the eggs with soil. Kushlan (1988) reported that hatching occurs from mid-July through late August. However, more recent data from ENP indicate that hatching can occur as early as June 16th (Cherkiss et al. 2020). Once the eggs begin hatching, the female usually opens the nest and carries the hatchlings to water in her mouth (See Figure 5).

In Florida, female crocodiles have not been observed defending their nest during incubation (Kushlan and Mazzotti 1989). Therefore, it is assumed that most female crocodiles would vacate the nest area if disturbed by a mower equipment.

It is important to note that a freshly laid crocodile nest is conspicuous, and would likely be noticeable, and thus avoided by mowing equipment operators during the first 30 days or so.

However, because crocodiles lay eggs in the spring and summer, which coincides with the season of rapid plant growth, crocodile nests often become concealed by growing vegetation after about 30 days. This is significant to note, because mowing equipment operators would not likely notice and avoid crocodile nests concealed by tall vegetation. The likelihood that mowing equipment operators would notice and report crocodile nests that have been passed over is estimated to be about 25 percent (Dean 2021b). Figure 4 is a representative photo of a crocodile nest within a maintained area.

ENP will inform mowing crews and contractors to be vigilant in these areas and work to avoid crocodile nests. However, experience suggests that this measure will likely minimize impacts, but not completely avoid them. According to ENP biologist with site-specific expertise regarding crocodile nests in the Flamingo District and mowing operations, it is reasonable to estimate that mower operators would likely detect and avoid approximately 30 percent of crocodile nests that are encountered. Based on the general design of the mower equipment used and the structure of crocodile nests, it is estimated that approximately 50 percent of crocodile nests will survive a mower pass, because about half the time the mower deck will likely pass over the nest cavity (Dean 2021b). However, for the other 50 percent of nests, the mower wheels may crush and/or expose eggs to predation and/or the elements resulting in harm.

To date, there have not been comprehensive surveys for nesting crocodiles in the developed/maintained areas within the Flamingo District of ENP. However, there is other ongoing monitoring of the American crocodile in the Flamingo District, which is focused on crocodile nesting effort and success, growth, survival, distribution, relative abundance, and body condition. This ongoing monitoring program is conducted by the Florida Cooperative Fish and Wildlife Research Unit and recorded 44 crocodile nests from the years 2005 through 2020 (See Figure 6), which averages to approximately 3 nests per year (Florida Cooperative Fish and Wildlife Research Unit, 2020). However, the nests were likely incidentally detected in areas the researchers frequented, and this data set represents minimum estimates of nesting within those areas.

ENP staff biologists with site-specific knowledge of the Flamingo District area estimate that an average of 20 crocodile nests occur annually along roads and developed areas that are maintained. As of April 22, ENP staff biologists have identified approximately 18 nests within mowed areas during the 2021 nesting season. ENP recognizes that this still may be an underestimate because of undetected nests. Crocodile nesting is not evenly distributed in mowed areas and is clustered on higher ground adjacent to water bodies and waterways occupied by crocodiles. Considering the increased crocodile population within the Flamingo District area and sea level rise, it is reasonable to assume that more crocodiles may seek the limited higher ground for nesting as the water table rises and therefore more nesting may occur along the elevated roadways and other developed areas of Flamingo in coming years (Muiznieks, 2021).

The estimate of possible effects of the action on the American crocodile is derived by the reasonable assumption that an average of 30 crocodile nests will be constructed annually in maintained areas from 2021 to 2040. As previously stated, the average clutch size is 35 eggs (Cherkiss et al. 2020). Roughly 30 percent of these nests (9) will be detected and avoided while 70 percent of these nests (21) will be passed over with mowing equipment each year. Mowing

equipment which straddles the nest will not likely significantly damage the egg chamber and harm the eggs within. However, nests that are run over by the tires of mowing equipment will likely significantly damage the egg chamber and harm the eggs within. As previously stated, based on the general design of the mower equipment used and the structure of crocodile nests, it is estimated that about half the time the mower deck will likely pass over the nest cavity (Dean 2021b). Therefore, about 50 percent (11) nests will survive the mower pass, leaving approximately 10 nests per year that will likely be harmed. It is estimated that equipment operators will notice and report only 25 percent of the nests that are passed over.

In summary of this best available information, we estimate that the proposed action would reasonably likely result in take of no more than 10 crocodile nests per year, of which an average of only 2 will be observed and reported each year, throughout the 20-year duration of the action.

Everglades bully

This species has been known to occur in the vicinity of the Entrance Station, Ernest Coe Visitor Center, Royal Palm Access Road, and along the Main Park Road in the Pine Island District of ENP and likely occurs at several other vegetation maintenance areas within this District. Impacts to Everglades bully resulting from maintenance activities performed around developed areas, facilities and/or paved roads/paths is likely to occur on a limited basis. Direct impacts from mowing, trimming or other vegetation maintenance may result in injury and possibly mortality of some individuals. However, this perennial species would likely re-sprout following cutting. Unintentional impacts to Everglades bully are most likely to result from side trimming of the tree line and mowing of the road shoulder in areas where plants are found. Equipment may unintentionally run over or otherwise damage plants while carrying out vegetation maintenance, leading to limited injury or mortality. Casting debris, stacking brush and/or discharging clippings may also injure or kill seedlings if they are covered with debris. Vista management may also result in impacts to individuals within the Pine Island District. As the maintenance of the areas around Long Pine Key has been routinely performed for decades it is unlikely that the vegetation management described herein would lead to measurable impacts to occurrences of this species or the continued existence of this plant. However, because this species requires a low and open understory layer, and vegetation maintenance mimics prescribed fire and maintains an open understory, individuals may persist or even thrive within or immediately adjacent to the maintained areas.

Florida pineland crabgrass

Impacts to Florida pineland crabgrass resulting from maintenance activities performed around developed areas, facilities and/or paved roads/paths may occur due to the high potential for this species to occur around several culverts within the Pine Island District. Trimming of Florida pineland crabgrass may occur if plants become established in the mowed areas between mowing events; however, this scenario is unlikely due to the monthly to bi-monthly frequency of these events. Equipment may unintentionally run over or trample plants while carrying out vegetation maintenance, leading to limited injury or mortality. Casting debris, stacking brush and/or discharging clippings may also injure or kill seedlings if they are covered with debris. As the maintenance of the areas around Long Pine Key has been routinely performed for decades it is

unlikely that the vegetation management described here would lead to measurable impacts to occurrences of this species or the continued existence of this plant. However, because this species requires a low and open understory layer, and vegetation maintenance mimics prescribed fire and maintains an open understory, individuals may persist or even thrive within or immediately adjacent to the maintained areas.

Florida prairie-clover

Maintenance of the road shoulder is considered necessary to maintain the integrity of the road and to prevent vegetation from encroaching and causing hazards to staff and visitors. Impacts to individual plants of Florida prairie-clover will likely result from mowing, including physical damage to individuals and mortality of some plants. The long-term maintenance of low and open vegetation in and adjacent to the area where plants are found will likely allow the population to persist in this location by maintaining suitable disturbed habitat.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the Action Area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Cumulative effects are analyzed for listed species that may be adversely affected by the proposed action.

American crocodile, Everglades bully, Florida pineland crabgrass, and Florida prairie-clover

Past projects that have impacted the American crocodile, Everglades bully, Florida pineland crabgrass, and Florida prairie-clover include the acquisition of lands in the East Everglades addition under the Expansion Act. Acquisition of these areas has expanded the protected areas within ENP and has protected habitat for these species, resulting in long-term beneficial impacts. Past, present, and future actions that impact these species include all of the projects aimed at restoring habitat and delivering additional freshwater to ENP. As a result of these actions, there would be additional habitat for these species in ENP. Use of wildland fire by fire management has helped maintain and improve habitat for these plant species over the long term. Activities that have and continue to adversely affect these plant species in ENP include trampling, collecting, diminished freshwater flows, habitat fragmentation, past agricultural practices, and sea level rise. The past, present, and reasonably foreseeable future actions described above would result in a mixture of long-term adverse and beneficial impacts on special status species. These impacts, when combined with the impacts from the proposed action, would result in generally beneficial cumulative impacts to these species, due to the maintenance and improvement of habitat.

In summary, the proposed action in not expected to have a cumulative negative effect to the American crocodile, Everglades bully, Florida pineland crabgrass, and Florida prairie-clover given the conservation measures outlined. Therefore, the Service does not anticipate any appreciable negative cumulative effects from the proposed action to these species.

JEOPARDY CONCLUSION

Pursuant to 50 CFR § 402.02, "*jeopardize the continued existence of*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. *Recovery* is defined as the improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA (50 CFR § 402.02).

"*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the PCE's essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR § 402.02; 81 FR 7214-7226).

American crocodile

After reviewing the current status of the American crocodile, the environmental baseline for the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service's BO that the proposed action is not likely to jeopardize the continued existence of the American crocodile. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the American crocodile. We make these findings for the following reasons.

- The potential effects to the American crocodile and its habitat are confined to several areas within the Flamingo District (Figure 6).
- As previously expressed in the *Effects of the Action* section of this BO, we estimate that, on average, no more than 35 crocodile eggs (1 nest) will be harmed per year.
- The proposed action would not result in the loss or conversion of American crocodile habitat.
- The conservation measures for the American crocodile that are part of the proposed action would reduce, but not completely eliminate, the possibility that impacts would occur.

Everglades bully

After reviewing the current status of the Everglades bully, the environmental baseline for the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service's BO that the proposed action is not likely to jeopardize the continued existence of the Everglades bully. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the Everglades bully. We make these findings for the following reasons.

- Direct impacts from mowing, trimming or other vegetation maintenance may result in injury and possibly mortality of some individuals. However, this perennial species would likely re-sprout following cutting.
- Everglades bully requires a low and open understory layer, and vegetation maintenance mimics prescribed fire and maintains an open understory. Everglades bully has been known to occur in the vicinity of the Entrance Station, Ernest Coe Visitor Center, Royal Palm Access Road as well along the Main Park Road in the Pine Island District of ENP and likely occurs at several other vegetation maintenance areas. Thus, it is reasonable to assume that Everglades bully will continue to persist or even thrive within and/or immediately adjacent to the maintained areas.
- The conservation measures for Everglades bully that are part of the proposed action would reduce, but not completely eliminate, the possibility that impacts would occur.

Florida pineland crabgrass

After reviewing the current status of Florida pineland crabgrass, the environmental baseline for the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service's BO that the proposed action is not likely to jeopardize the continued existence of Florida pineland crabgrass. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of these species. We make these findings for the following reasons.

- Florida pineland crabgrass requires a low and open understory layer, and vegetation maintenance mimics prescribed fire and maintains an open understory. Thus, it is reasonable to assume that Florida pineland crabgrass will have the potential to persist or even thrive within and/or immediately adjacent to the maintained areas.
- The conservation measures for Florida pineland crabgrass that are part of the proposed action would reduce, but not completely eliminate, the possibility that impacts would occur.

Florida prairie-clover

After reviewing the current status of Florida prairie-clover, the environmental baseline for the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service's BO that the proposed action is not likely to jeopardize the continued existence of Florida prairie-clover. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of Florida prairie-clover. We make these findings for the following reasons.

- Florida prairie-clover requires a low and open understory layer, and vegetation maintenance mimics prescribed fire and maintains an open understory. Thus, it is reasonable to assume that Florida prairie-clover will continue persist or even thrive within and/or immediately adjacent to the maintained areas.
- The conservation measures for Florida prairie-clover that are part of the proposed action would reduce, but not completely eliminate, the possibility that impacts would occur.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described in the Reasonable and Prudent Measures and Terms and Conditions below are nondiscretionary, and must be undertaken by NPS and the Service so they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The NPS and the Service have a continuing duty to regulate the activity covered by this incidental take statement. If NPS and the Service fail to assume and implement the Terms and Conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, NPS and the Service shall report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

In addition to the American crocodile, this BO evaluated effects of the proposed action on three federally listed plant species: Everglade bully, Florida pineland crabgrass, and Florida prairie-clover. Please note that sections 7(b)(4) and 7(o)2 of the ESA, which provide the authority for issuing an incidental take statement, generally do not apply to listed plant species. However, section 9(a)(2) of the ESA prohibits certain acts with respect to endangered plant species, including:

(a) remove and reduce to possession from areas under Federal jurisdiction.
(b) maliciously damage or destroy on areas under Federal jurisdiction; and
(c) remove, cut, dig up, or damage or destroy on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law.

Regulations issued under ESA §4(d) extend the prohibition under (a) above to threatened plant species (50 CFR §17.71). The damage or destruction of endangered and threatened plants that is incidental to (not the purpose of) an otherwise lawful activity is not prohibited.

Because plants are not included in the §9 prohibition of the ESA, BOs do not exempt the taking of plants. Therefore, the following incidental take statement only exempts take of the American crocodile and does not exempt take of Everglades bully, Florida pineland crabgrass, and Florida prairie-clover.

AMOUNT OR EXTENT OF TAKE

American crocodile

As previously explained, in the *Effects of the Action* section of this BO, there is reasonable certainty that the proposed action would result in take to the American crocodile. The resulting incidental take from the action is expected to be in the form of harm, including direct mortality to American crocodile eggs. The Service anticipates incidental take of the American crocodile will be difficult to detect because, as explained in the *Effects of the Action* section of this BO, American crocodile nests are difficult to detect due to rapid growth rates of vegetation, and the likelihood of documenting that a nest has been run over by a mower is considered to be approximately 25 percent (Dean 2021b). Due to the 25 percent detection probability, every nest reported as being run over with wheels of mowing equipment will count as 4 nests incidentally taken.

Based on the best available data, we estimate that, on average, a maximum of 350 American crocodile eggs (10 nests) per year are likely to be harmed by the action, which amounts to no more than 7,000 American crocodile eggs (200 nests) throughout the 20-year duration of the action.

However, due to the implementation of the measures discussed in this BO and the estimated 25 percent detection probability, we believe that the actual take will be less. The Service and ENP have agreed that 20 reported nests (80 estimated nests) is a reasonable limit in view of these actions. In accordance with 50 C.F.R. § 402.14(i)(1)(i), for purposes of this BO, take will be considered exceeded if the running total of nests reported as being run over and damaged by wheels of mowing equipment exceeds 20. This amount will be counted as 80 actual nests considering the 25 percent detection probability.

The Service is setting this limit in view of the fact the action has a 20-year duration, and because we believe that additional adaptive management and/or measures to minimize take to crocodile eggs beyond this limit may be implemented if this number is approached.

Such measures may include:

- Surveys of all areas of suitable crocodile nesting habitat for the presence of active crocodile nests and crocodile nesting behavior during the crocodile breeding season (March 1st – August 31st) by an individual trained to identify crocodile nests prior to all mowing activities in those areas. If active crocodile nests are discovered, nesting activity should be documented (i.e. GPS coordinates and/or picture) and reported to the

- Biological Resources Branch Chief and/or Threatened and Endangered Species Biologist. Biological staff should coordinate with the Service to either establish a buffer distance or cease work in the area until the end of nesting season to minimize effects to identified crocodile nests.
- Tractors used in all areas of suitable crocodile nesting habitat should be equipped with boom mowers with a design that enables the tractor wheels to remain on the road and in freshly mowed areas where practicable. Tractors of such design would minimize the number of wheel tracks in the areas and would enhance the ability of the equipment operator to see, and thus avoid, crocodile nests with tractor wheels.

EFFECT OF TAKE

In the accompanying BO, the Service determined the level of anticipated incidental take, as assessed with current information, is not likely to result in jeopardy to the American crocodile, Everglades bully, Florida pineland crabgrass, and Florida prairie-clover.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give Reasonable and Prudent Measures (RPMs) it considers necessary and appropriate to minimize the take, along with Terms and Conditions that must be complied with, to implement the reasonable and prudent measures. The primary objective of the Service's RPMs is to provide recommendations for minimizing adverse effects to listed species and to critical habitats.

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of the American crocodile:

- In order to increase detection and reporting of crocodile nests that have been run over by wheels of mowing equipment, NPS will ensure that visual inspections of "post-mowed" areas occur where practicable.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA to apply to the action, the NPS must comply with the following terms and conditions, which implements the reasonable and prudent measure listed above. These terms and conditions are non-discretionary.

Where practicable, maintained areas of suitable crocodile nesting habitat will be surveyed for the presence of crocodile nests within 7 days after they are mowed during the crocodile breeding season (March 1st – August 31st) by an individual trained to identify crocodile nests.

All crocodile nests (active, inactive, undamaged, damaged) discovered during the surveys will be reported as described in the following *Monitoring and Reporting Requirements* section of this BO.

MONITORING AND REPORTING REQUIREMENTS

As previously explained in this BO, take of the American crocodile will be difficult to detect. But, pursuant to 50 CFR § 402.14(i)(3), ENP must provide adequate monitoring and reporting to determine if the amount or extent of take is approached or exceeded. Annual reports for this BO should be submitted to the Service. The reports shall confirm the number of American crocodile nests run over by mowing equipment during that year, as well as the running total of nests damaged by mowing equipment, and that the conservation measures for the American crocodile have been adhered to. The reports shall include the location (GPS coordinates) of all nests detected, date of detection, and individual who observed the nest. The reports should be submitted to the Service biologist listed below by January 31 for the previous year for each of the 20 years of the Action's duration (2021 – 2041), or immediately after a the exempted take has been exceeded (a rolling total of 5 crocodile nests have been reported as being damaged by mowing equipment.

Contact the project biologist, James Gruhala, at 772-469-4250 or by electronic mail at james_gruhala@fws.gov with any questions.

DISPOSITION OF DEAD OR INJURED SPECIES

Upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office: 20501 Independence Blvd., Groveland, Florida 34736; 352-429-1037 as well as the biologist identified below at the Florida Ecological Service Field Office, 772-562-3909. Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission: 3900 Drane Field Road; Lakeland, Florida, 33811-1299; 800-282-8002. Care should be taken in handling sick or injured specimens to ensure effective treatment and in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA requires Federal agencies to use their authorities to further the conservation of federally listed species by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of the ESA. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the Service to be kept informed of activities that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations below.

The Service recommends for the NPS to implement the following conservation recommendations in accordance with section 7(a)(1) of the ESA:

- The long-term stability of federally listed plant populations within ENP is interpreted as a measure of the success in protecting covered plant populations where they occur. If certain populations of federally listed plant species are considered vulnerable by the Service and need more fine scale monitoring to determine the occurrence of plant populations either within or beyond the current extent, ENP should work in coordination with the Service to develop and implement these strategies.

- ENP, South Florida Natural Resources Center, Biological Resources Branch should continue to collaborate to monitor populations of federally listed plants that occur within ENP including Blodgett's silverbush, Cape Sable thoroughwort, Everglades bully, Florida pineland crabgrass, Florida prairie-clover, Garber's spurge, pineland sandmat , and pineland croton (the host plant species for Bartram's scrub-hairstreak and Florida leafwing butterflies) within ENP. The results of this monitoring should be used to adjust management activities within ENP to benefit these species.

- ENP should continue to collaborate with The University of Florida, Fort Lauderdale Research and Education Center and the US Geological Survey Southeast Ecological Science Center to monitor American crocodiles within ENP.

REINITIATION NOTICE

This concludes formal consultation for the NPS's, proposed Vegetation Maintenance at Developed Areas and Facilities in ENP Project (Consultation Code # 04F2000-2021-F-0216). As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely affect listed species or designated critical habitat in a manner or to an extent not considered in this BO; 3) the action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this BO; or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation of consultation with the Service.

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LIST OF FIGURES

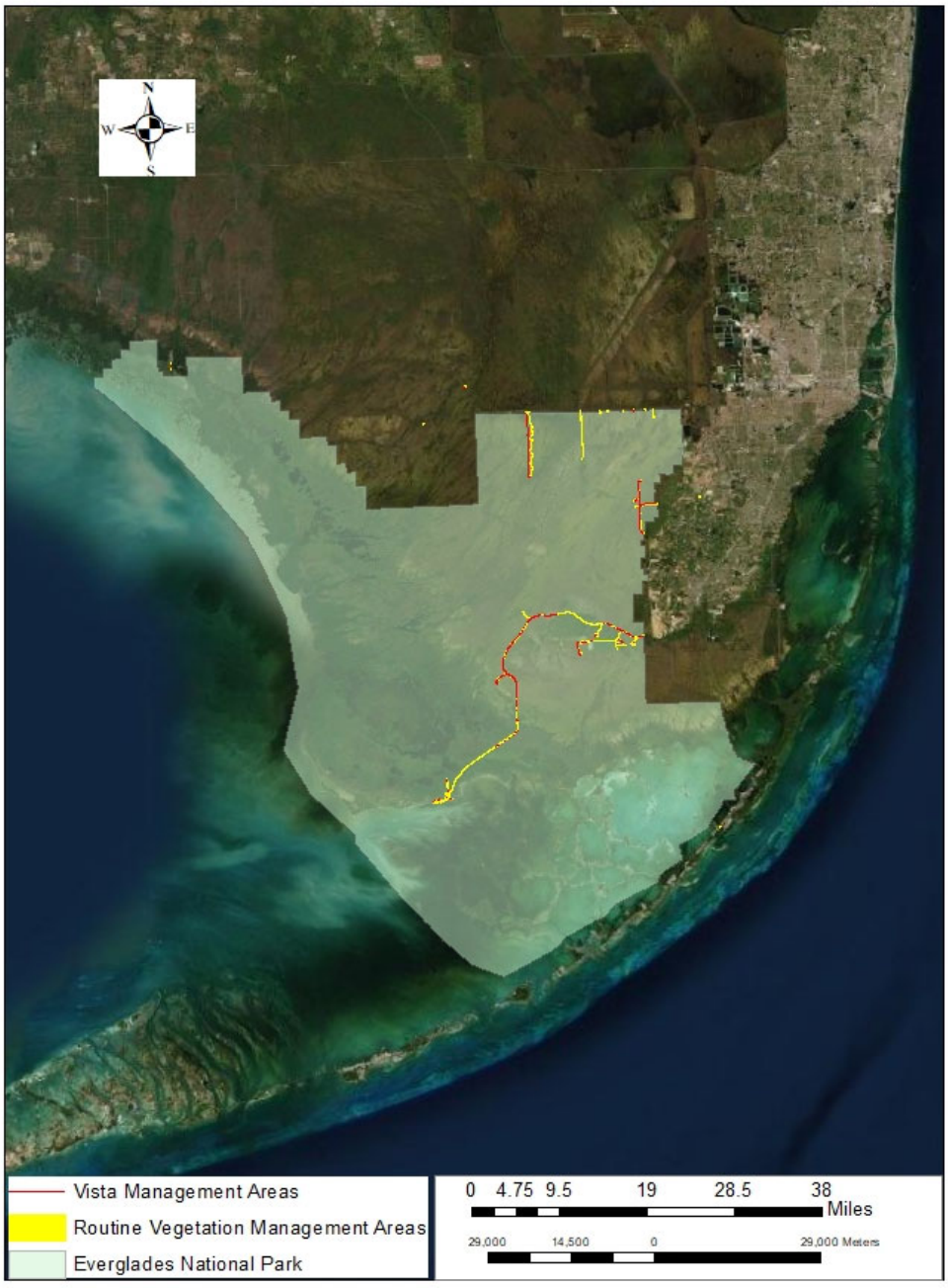

Figure 1: An overview of the entire Action Area

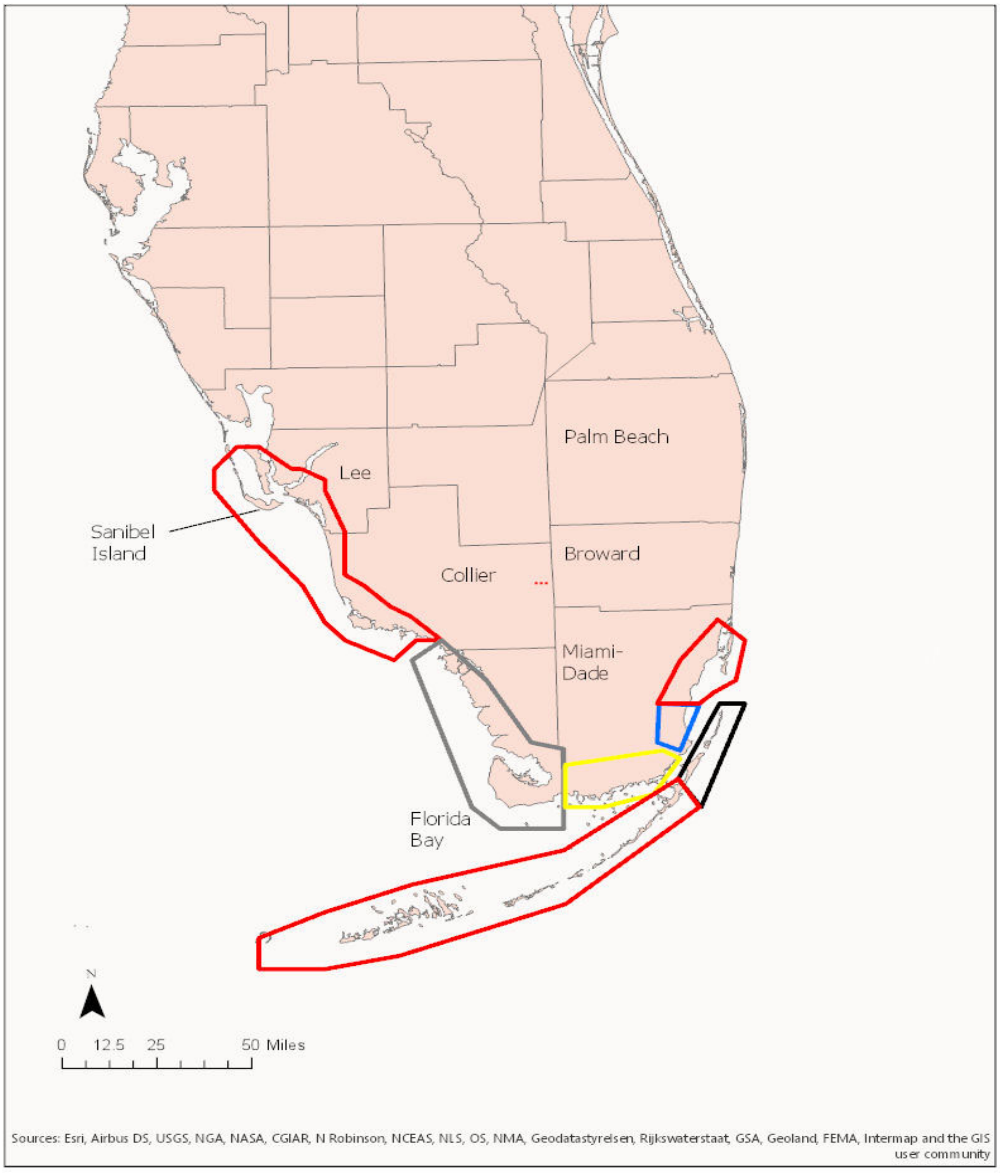

Figure 2. General locations of the primary nesting areas of the American crocodile in south Florida (Blue polygon = TPPP; Black polygon = North Key Largo including Crocodile Lake NWR (CLNWR); Yellow polygon = northeast Florida Bay in ENP; Gray polygon = Flamingo/Cape Sable in ENP; Red polygon = Other (nesting occurring within three non-contiguous areas consisting of Biscayne Bay from North of the TPPP Site to Virginia Key, Florida's Keys from south of CLNWR to Key West, and the West Coast of Florida from North of Highland Beach to Sanibel Island).

Figure 3: A photo of a crocodile egg. Photo credit: John Wrublik, USFWS

Figure 4: A representative crocodile nest along a roadside in Crocodile NWR. Photo credit: John Wrublik, USFWS

Figure 5: A photo of an adult female crocodile carrying hatchlings to water at the TPPP. Photo credit: FPL

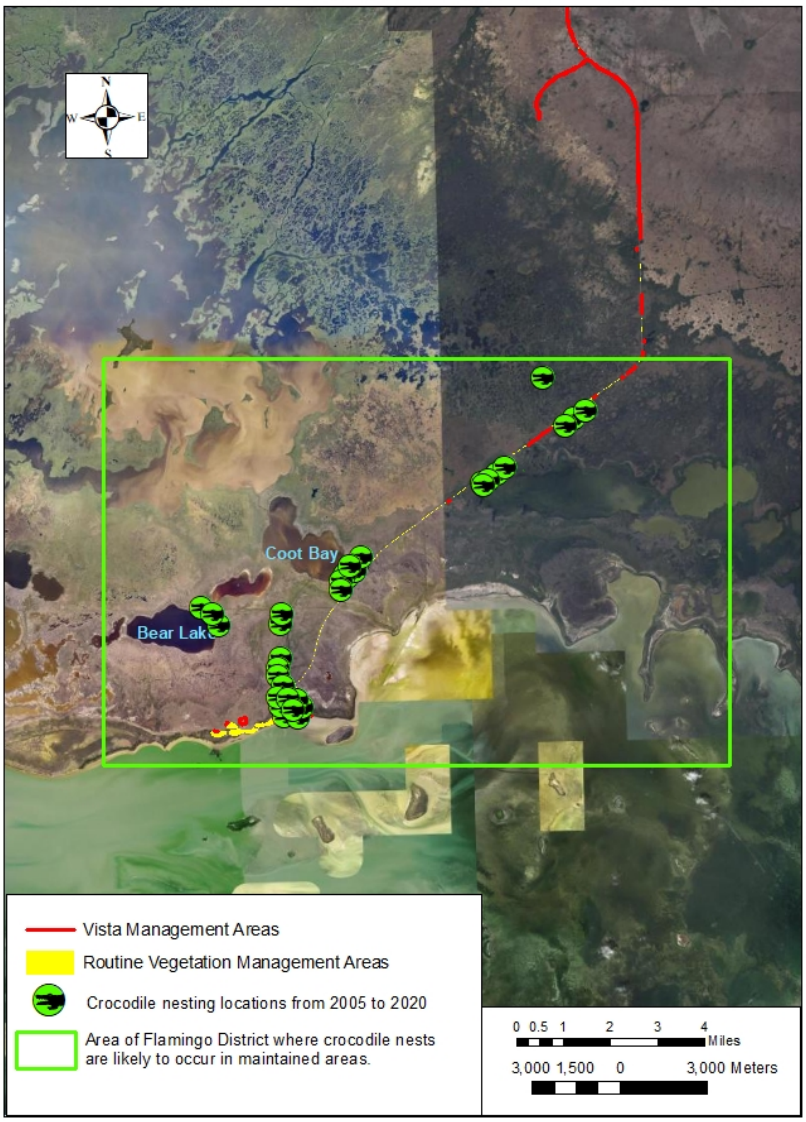

Figure 6: Crocodile nesting locations from 2005 to 2020 that were recorded by the Florida Cooperative Fish and Wildlife Research Unit.

APPENDIX A

Detailed Justification for Concurrence on Not Likely to Adversely Affect Determinations for Florida bonneted bat and its proposed critical habitat, Florida panther, Cape Sable seaside sparrow, Eastern black rail, Everglade snail kite, piping plover, red knot, wood stork, American crocodile critical habitat, Eastern indigo snake, gopher tortoise, Bartram's scrub hairstreak butterfly, Florida leafwing butterfly, Cape Sable thoroughwort critical habitat, and Florida bristle fern proposed critical habitat

MAMMALS

Effects of the action on the Florida bonneted bat and Florida bonneted bat proposed critical habitat

The federally endangered Florida bonneted bat (*Eumops floridanus*) may occur in the Action Area. Because Florida bonneted bats forage at night, vegetation maintenance activities are not expected to affect bonneted bat foraging activities. This bat species typically roosts singly or colonially in the cavities of trees. Although no known Florida bonneted bat roost sites exist in ENP, trimming of trees with dead branches or cavities or removal of snags may impact potential roost sites.

The Proposed Rule to designate critical habitat for the endangered Florida bonneted bat was published in the Federal Register on June 10, 2020 (Service 2020). In accordance with section 7(a)(4) of the ESA, the NPS is requesting to conference on the action's effects to proposed critical habitat for the Florida bonneted bat.

Vista clearing and vegetation maintenance, including side trimming and hazardous tree removal, will require impacts to vegetation and trees within the proposed critical habitat for the Florida bonneted bat. No tree removal of any kind (alive or dead) is permitted anywhere within ENP without prior authorization from ENP's resource management staff.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Florida bonneted bat:

- When planned vista clearing and vegetation maintenance includes felling any trees or snags, biological staff will be notified to allow inspection of any trees or snags greater than 33-ft (10-m) in height, greater than 8-in (20.3 cm) in diameter at breast height, or with cavity elevations higher than 16-ft (5-m) above ground level. Trees and snags will be inspected for potential roosting sites (i.e. cavities or loose bark) and investigated further with a peeper camera if a potential roosting site is found.
- If an inspection cannot be conducted by resource management staff, no trimming or felling activities may occur and must be postponed until surveys can be conducted.
- If an active bat roost is found, an acoustic recorder will be set up in an attempt to verify species. In most cases, known roost trees will be left in place and not removed. In all cases where active bonneted bat roosts are found, the Service will be contacted for further guidance.

In summary of this information and considering the conservation measures for the Florida bonneted bat, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Florida bonneted bat and Florida bonneted bat proposed critical habitat. If the proposed rule to list Florida bonneted bat critical habitat becomes finalized, this Conference Concurrence can then be adapted as a Concurrence Letter for Florida bonneted bat critical habitat.

Effects of the action on the Florida panther

The federally endangered Florida panther (*Puma concolor coryi*) can be found anywhere within the boundaries of ENP but have most consistently been reported from East Everglades and the Long Pine Key area. ENP staff sporadically receive reports of sightings in ENP ranging from a few to a couple dozen annually. Although cats are rarely observed, panther sign is easily observed when they are using an area. No radio telemetry work is currently being conducted so exact locations of panthers in ENP are not known. Game cameras are intermittently used by Park staff but cannot be left in place continually because of various reasons including the use of trails and roads as fire breaks during prescribed fires, potential for vandalism during peak visitor season, government shutdown, lack of sufficient resources, etc. Panthers may utilize established trails because of ease of travel (i.e. path of least resistance) but may also avoid their use during times of high human activity or only use them at night.

Panthers require large, contiguous areas of suitable habitat to meet their social, reproductive, and energetic needs. In south Florida, panthers prefer mature upland forests (hardwood hammocks and pinelands) over other habitat types. Upland forests provide dry ground for resting and denning, and prey density is higher than it is in lower habitats where flooding is more common. Panther habitat selection is related to prey availability, which means they select habitats that make prey vulnerable to stalking and capturing. Dense understory vegetation provides some of the most important feeding, resting, and denning cover for panthers.

Female panthers give birth to kittens most commonly between March and July. Before giving birth, the female panther chooses a den site, usually in a palmetto thicket. Panthers do not go to any effort to prepare a den. However, an opening is created in the dense vegetation by the mother resting and nursing kittens for several days in the same location. Panther activity is greatest from dusk to dawn so the likelihood of the vegetation maintenance staff encountering a Florida panther is extremely low given the low population estimate for panthers in ENP.

Direct and indirect impacts to the Florida panther could result from potential harassment of individuals due to the presence of people and the use of equipment for vegetation management activities. Anticipated effects are limited to temporary changes in behavior as a result of routine maintenance activities. Due to the abundance of suitable habitat for the Florida panther within ENP in comparison to the relatively small areas being impacted and the infrequency and short duration of these temporary maintenance disturbances, maintenance activities performed around developed areas and facilities within Pine Island, Flamingo and NW Districts would be anticipated to result in discountable and insignificant effects to the Florida panther.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Florida panther:

- If a panther is observed in the vicinity of any trail maintenance activities, all work will stop until the panther vacates the area.
- All sightings will be reported to ENP's Biological Resources Branch Chief and/or the Threatened and Endangered Species Biologist.
- Evidence, such as pictures of cats or tracks, will be provided to ENP's wildlife biologist along with date, time and location (GPS coordinates) the panther was observed.

In summary of this information and considering the conservation measures for the Florida panther, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Florida panther.

BIRDS

Effects of the action on the CSSS (CSSS) and designated CSSS critical habitat

The federally endangered CSSS is documented to occur within the vicinity of the Action Area. The nesting season for CSSS occurs from February to August, with most nesting activity occurring from April 1 to June 15. The length and timing of nesting depends on flooding, as nesting will be delayed or terminated if flood waters become too high. CSSS build their nests in clumps of grass that are around six in (15.2 cm) off of the ground. The species typically inhabits areas that are periodically burned and flooded. These areas include flooded inland prairies of cordgrass (*Spartina* spp.), muhly grass (*Muhlenbergia capillaris*), and short sawgrass (*Cladium jamaicense*). Improper water regimes can cause delays in nesting or termination of nesting. Encroachment of hardwoods and the removal of dead plants can reduce the suitability of the habitat for breeding. Prescribed fire is the usual method to maintain this habitat; however, fire can kill adults, their young, and eggs unless properly timed and planned.

Impacts to the CSSS may occur from potential harassment of foraging individuals due to the presence of people and the use of equipment for vegetation management activities; however, these potential impacts would be limited to temporary changes in foraging behavior as a result of the continued maintenance activities. Vegetation management and vista management activities occur within designated CSSS critical habitat at the following locations: Main Park Road, Mahogany Hammock Road, Nike Missile Grounds, and Chekika Area Roads. Work associated with maintenance activities that occurs within the critical habitat for this species, may result in limited direct impacts to Primary Constituent Elements (PCE), per the CSSS Critical Habitat Rule (Service 2007). However, continued vegetation maintenance activities would not likely significantly affect the CSSS ability to breed or feed and, therefore, would not be anticipated to adversely affect CSSS critical habitat.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Cape Sable sea sparrow and Cape Sable sea sparrow critical habitat:

- Suitable CSSS habitat is surveyed annually to determine if CSSS are present. Surveys include potential and suitable habitat which occurs primarily in the Pine Island District of ENP.
- If sparrows are known to occur in the vicinity of any mowed and maintained areas, vegetation maintenance activities will occur outside of the breeding season or an appropriately sized buffer will be established around the known location(s).
- Vegetation maintenance staff and/or contractors will coordinate with the NPS wildlife biologist to determine if any new CSSS have been documented in the vicinity of the vegetation maintenance areas and whether or not timing restrictions need to be implemented.

In summary of this information and considering the conservation measures for the CSSS and CSSS critical habitat, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the CSSS and CSSS critical habitat.

Effects of the action on the Eastern black rail

The Eastern black rail (*Laterallus jamaicensis jamaicensis*) is a subspecies of black rail that has recently been listed as a threatened species under the ESA. The Eastern black rail is a small, cryptic marsh bird that occurs in salt, brackish, and freshwater wetlands that can be tidally or non-tidally influenced. This species requires dense vegetative cover that allows movement underneath the canopy. Plant structure (rather than plant species) is important for predicting habitat suitability. Occupied habitats tend to primarily be composed of fine-stemmed emergent plants (rushes, grasses, and sedges) with high stem densities and a dense canopy cover (Flores and Edelman 1995). Little is known about the subspecies' population structure and dynamics. Black rails have been documented along the Main Park Road as well as other locations in ENP by citizen scientists (e.g. eBird, Christmas Bird Counts) and researchers.

Although Eastern black rails have been detected along roads in ENP, our best available data indicates the actual locations of these birds was in densely vegetated marsh habitat (as previously described), a distance from the roadside. Eastern black rails do require higher elevation refugia with dense cover to survive high-water events due to the tendency of juvenile and adult black rails to walk and run rather than fly and chicks' inability to fly. Therefore, Eastern black rails may seek refuge on higher elevation roadside rights-of-way during high water events. However, based on the Eastern black rails' propensity for dense vegetative cover habitat and the species' reclusive behavior, the nature of the proposed action, and factoring the conservation measures for the species listed below it is reasonable to believe the potential effects to Eastern black rails would be insignificant and discountable.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Eastern black rail:

- NPS Biological staff will work with maintenance staff to avoid activity proximal to any known Eastern black rail nesting areas if maintenance activities are to occur near known Eastern black rail locations.
- All sightings of Eastern black rails will be reported to the NPS Biological Resources Branch Chief and/or the Threatened and Endangered Species Biologist.
- Vegetation maintenance staff will coordinate with the NPS resource management staff to determine if any new Eastern black rails have been documented in the vicinity of the vegetation maintenance areas and determine whether or not timing restrictions or buffers need to be implemented in these areas.

In summary of this information and considering the conservation measures for the Eastern black rail, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Eastern black rail.

Effects of the action on the Everglade snail kite and Everglade snail kite designated critical habitat

Everglade snail kites (*Rostrhamus sociabilis plumbeus*), which are a federally threatened species, may use nearly any wetland within south Florida under some conditions and during some portions of their life history. However, the majority of nesting is concentrated within the large marsh and lake systems of the Greater Everglades and Upper St. John's marshes (Martin et al. 2007). Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes (natural and man-made) where native and non-native apple snails can be found. Suitable foraging habitat is typically a combination of low profile (less than 3 m) marsh with an interdigitated matrix of shallow (0.2 to 1.3-meter-deep) open water, which is relatively clear and calm. Snail kites feed visually in open water with a range of water depths. Snail kites are nomadic in response to water depths, hydroperiod, food availability, and other habitat changes. Shifts in distribution can be short term, seasonal, or long term, and can take place between areas from year to year, between areas within a given nesting season, within areas in a given nesting season, and within or between areas for several days to a few weeks.

Shallow wetlands with emergent vegetation such as spike rush, bulrush, and other native emergent wetland plant species provide good snail kite foraging habitat as long as the vegetation is not so dense that kites would have difficulty locating apple snails. The specific conditions and vegetation that provide good snail kite foraging habitat vary depending on the specific conditions of each wetland (lake or marsh, variability in water depths, soil characteristics, etc.). Not all areas where there are abundant apple snails support snail kite nesting, but most of these areas provide foraging habitat for snail kites at some time.

The snail kite's breeding season varies within a period extending from January to September. In recent years, most of the documented nesting in ENP has occurred in Northeast Shark River Slough. Relatively high numbers of snail kites have been detected foraging west of the known ENP nesting areas and in proximity to designated critical habitat; however, nesting has not yet been confirmed for these individuals.

Critical habitat for the Everglade snail kite was designated on September 22, 1977. Critical habitat in ENP is located along Shark River Slough from the L-67 extension west to the Dade-Monroe County Boundary (approximately 13-14 mi) and then south into ENP for approximately 21-25 mi. Most snail kites nesting in ENP from 1996 to 2019 have been detected outside (east) of the designated critical habitat boundary. Because this was one of the first critical habitat designations under the ESA, there were no primary constituent elements defined. The Shark Valley Area of the Action Area is within designated critical habitat for the snail kite. Although some maintenance activities may occur in wetlands, these activities would not likely significantly affect the hydrology or the suitability of the area for Everglade snail kite foraging.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Everglade snail kite and Everglade snail kite critical habitat:

- If an Everglade snail kite is observed during maintenance activities, work will be modified to not disturb the birds. No activities will be conducted within 130 m (425 ft) of any roost sites.
- All snail kite nesting activity observed in the Action Area will be immediately reported to ENP's Biological Resources Branch Chief and/or Threatened and Endangered Species Biologist. If a new, undocumented nesting area is located near a maintained area, vegetation maintenance activities will cease and be rescheduled outside of the breeding season.

In summary of this information and considering the conservation measures for the Everglade snail kite and its critical habitat, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Everglade snail kite and Everglade snail kite critical habitat.

Effects of the action on the piping plover and red knot

The piping plover (*Charadrius melodus*) and red knot (*Calidris canutus rufa*) are federally threatened marine and beach/shoreline-associated bird species that may occasionally occur along the coastal marine areas, and on beaches in particular, within ENP. However, these species are not likely to occur within the areas around the developed areas, facilities and/or paved roads/paths where maintenance activities would occur. Mowing activities within the Flamingo Campground and Lodging areas near the walk-in campgrounds and Amphitheater have the potential to flush roosting shorebirds including piping plovers and red knots. Mowing activities are not expected to injure or kill any shorebirds especially since equipment will be operated at a slow speed allowing any birds in the area to move out of the way. This level of harassment should be similar to the public walking through the area and is not likely to rise to the level of "take" as defined by the ESA.

The following conservation measure has been incorporated into the proposed action in order to minimize effects to the piping plover and red knot:

- Slow speeds will be maintained when conducting mowing activities especially when large congregations of shorebirds are present. Speeds should be slow enough to allow birds to move out of the way of the mower. Flushing of large shorebird flocks shall be avoided when possible.

In summary of this information and considering the conservation measure for the piping plover and red knot, the Service believes that effects to these species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the piping plover and red knot.

Effects of the action on the wood stork

Wood storks (*Mycteria americana*) are large wading birds that use freshwater and estuarine wetlands as feeding, nesting, and roosting sites. Wood storks are federally listed as a threatened species under the ESA, and are known to occur within ENP. Although wood storks are not habitat specialists, their needs are exacting enough, and available habitat is limiting enough, so that nesting success and the size of regional populations are closely regulated by year-to-year differences in the quality and quantity of suitable habitat. Wood storks are especially sensitive to environmental conditions at feeding sites; thus, birds may fly relatively long distances either daily or between regions annually, seeking adequate food resources (Ogden 1990).

Typical foraging sites for the wood stork include freshwater marshes and stock ponds, shallow seasonally flooded roadside ditches, narrow tidal creeks and shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Ideally, preferred foraging wetlands include a mosaic of emergent and shallow open-water areas. The Service recognizes a 29.9 km (18.6 mile) core foraging area around all known wood stork colonies in south Florida. The Service believes loss of suitable wetlands within the core foraging areas may reduce foraging opportunities for the wood stork.

ENP falls within core foraging areas for at least 20 active wood stork colonies, with an active site documented at the northwest corner of Paurotis Pond in the Flamingo District. No vegetation management activities are proposed in proximity to any recently active nesting sites. Substantial portions of mowed and maintained vegetation are adjacent to wetland areas and standing water may be present during the rainy season. However, all activities are to occur within areas that have been routinely maintained for decades, and no new impacts to wetlands will occur. Impacts to wood storks may occur from potential harassment of foraging individuals due to the presence of people and the use of equipment for vegetation management activities; however, these potential impacts would be limited to temporary changes in foraging behavior as a result of these continued maintenance activities and would not be anticipated to significantly affect wood stork foraging behavior or foraging suitability of these areas. Given the abundance of suitable foraging habitat throughout ENP in comparison to the areas being maintained and the infrequency of these temporary maintenance disturbances performed around developed areas, facilities and/or paved roads/paths within ENP, the activities are not likely to significantly affect wood storks.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the wood stork:

- Staff performing the vegetation maintenance program will be made aware of the potential presence of wood storks foraging along roadside habitats or any mowed areas adjacent to wetland boundaries. Contractors and staff will also be informed not to disturb or approach any wood storks.
- There will be no human intrusion into feeding sites when wood storks are present. If a solid vegetative barrier is present, vegetation maintenance activities will be no closer than 300 ft. If no vegetative barrier is present trail maintenance activity will be no closer than 750 ft.
- If any new nesting areas are discovered during vegetation maintenance activities, ENP's Biological Resources Branch Chief and/or Threatened and Endangered Species Biologist will be contacted and activities in that area will be delayed until after the breeding season has ended.

In summary of this information and considering the conservation measures for the wood stork, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the wood stork.

REPTILES

Effects of the action on American crocodile critical habitat

Most of the Flamingo District, including Main Park Road, is within designated American crocodile critical habitat. Because the effects of vegetation maintenance activities will be temporary, it is not likely that the proposed action will significantly affect the suitability or availability of crocodile nesting and basking areas.

Most of the Flamingo District, including Main Park Road, falls within American crocodile Critical Habitat. As maintenance activities are only considered a temporary impact to vegetation that does not affect the suitability or availability of nesting areas and may temporarily reduce suitability for basking and other behaviors, they will not substantially affect (quantity or quality) of crocodile Critical Habitat. Therefore, maintenance activities performed around developed areas, facilities and/or paved roads/paths within the ENP are anticipated to result in a ***'May Affect, Not Likely to Adversely Affect***' for American crocodile Critical Habitat.

In summary of this information and considering the conservation measures, the Service believes that the effects to American crocodile critical habitat will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for American crocodile critical habitat.

Effects of the action on the Eastern indigo snake

In ENP, the federally threatened Eastern indigo snake (*Drymarchon corais couperi*) is found in pine forests, tropical hardwood hammocks, freshwater marshes, coastal prairies, mangrove forests, abandoned farmland and developed urban interface areas. Eastern indigo snakes have been recorded in both pine rockland and tropical hardwood hammocks of the Long Pine Key area of ENP (Steiner et al. 1983).

Eastern indigo snakes will use gopher tortoise burrows as underground refugia as well as burrows of armadillos, cotton rats (*Sigmodon hispidus*), and land crabs; burrows of unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and crevices of rock-lined ditch walls (Layne and Steiner 1996).

Impacts to Eastern indigo snakes could potentially result from harassment of individuals due to the presence of people and the use of equipment for vegetation management. Direct impacts to indigo snakes may result from unintentional crushing by vehicles and maintenance equipment or entanglement in machinery. There are several records of Eastern indigo snakes within the vicinity of the vegetated areas to be maintained, including 2 roadkill reports from 2020. However, the proposed action will only temporarily affect indigo snake habitat, and will not remove or significantly alter Eastern indigo snake habitat suitability or the amount of habitat.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Eastern indigo snake:

- Standard Protection Measures for the Eastern Indigo Snake (August 12, 2013) (as applicable) will be implemented.
- Staff and contractors will be informed of the presence of Eastern indigo snakes and trained in Eastern indigo snake identification prior to conducting mowing maintenance activities.
- Live snakes will not be captured or handled.
- All snake sightings will be reported to ENP's Biological Resources Branch Chief and/ or Threatened and Endangered Species Biologist. Evidence, such as pictures of dead or live snakes, will be provided along with date, time and location (GPS coordinates) the snake was observed.

In summary of this information and considering the conservation measures for the Eastern indigo snake, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Eastern indigo snake.

Effects of the action on the gopher tortoise

Gopher tortoises (*Gopherus polyphemus*) are not federally listed under the ESA, but the eastern Distinct Population Segment is classified as a candidate species in the eastern portion of its range, which includes the states of Alabama, Florida, Georgia, and South Carolina. Candidate

species are defined as species that are being considered by the Secretary of Interior for listing as an endangered or threatened species, but not yet the subject of proposed rule (50 CFR 424.02).

Gopher tortoises are long-lived terrestrial turtles that can grow to about 15-in in length. Gopher tortoises typically live in upland areas with deep sand in which they are able to construct a burrow. The species is known to inhabit sandy pine flatwoods and pine rockland habitat in Miami-Dade County at sites where sufficient sand is present to construct burrows. Critical habitat has not been designated for this species.

It is possible that this species could be encountered in Long Pine Key and Pine Island within the Pine Island District. Gopher tortoises have been observed in the Long Pine Key and Pine Island areas of ENP on a few occasions over the past several decades. Individuals have been observed within the routinely mowed and maintained areas of roadside vegetation in Pine Island. It is thought that the individuals observed may represent released captive animals as sightings are very infrequent and burrows or other evidence of a persistent population have not been observed in the area. No real mechanism for natural dispersal is available for animals to colonize from adjacent populations.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the gopher tortoise:

- Staff performing the vegetation maintenance program will be informed of the potential presence of gopher tortoises and instructed to avoid impacting individuals to the extent possible while completing assigned work and meeting the objectives of the vegetation maintenance program.
- If a gopher tortoise is observed within an area to be mowed, mowing in the area will stop until the tortoise has been allowed to leave the area.

In summary of this information and considering the conservation measures for the gopher tortoise, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the gopher tortoise.

INVERTEBRATES

Effects of the action on the Bartram's scrub hairstreak butterfly and Bartram's scrub hairstreak butterfly designated critical habitat

Bartram's scrub hairstreak (*Strymon acis bartrami*) is a federally endangered, small butterfly that is found in pine rockland and marl prairie habitats that support its host plant, the pineland croton (*Croton linearis*). Typically, this species remains within approximately 10-ft (3 m) of their host plants. Adults take nectar from a variety of flowering plants. Adults and larvae of Bartram's scrub hairstreak have been observed by NPS staff over the past 15 years in suitable habitat throughout the Long Pine Key area. Pine rockland with pineland croton occurs in isolated patches along limited portions of Research Road and Main Park Road. No observations of this species have been made in pine rocklands within ENP east of Long Pine Key (e.g. Pine Island

and Parachute Key) and in these areas, the host plant is present in very limited areas away from development. Monitoring data indicates that populations of Bartram's scrub hairstreak fluctuate irregularly throughout the year and both adults and larvae can be present during any season. At times, individuals are difficult to detect, and this indicates that their overall numbers may be quite low. During these low points, populations may be especially vulnerable to disturbance or impacts to host plant populations. However, currently there are no specific times of year that are known to be greater or less likely to result in impacts to individuals.

No known occurrences of pineland croton are found in areas maintained as lawn that are included in this project. Therefore, no direct impacts to immature life stages (i.e., eggs and larvae) are anticipated to occur as a result of the action. Potential impacts from the action would likely be limited to disturbance of adult individuals visiting the maintained areas during mowing and trimming activities to nectar on flowers. Such butterflies would likely vacate the area during maintenance activities until the disturbance has completed. This level of harassment is unlikely to result in harm (injury or death) to individuals.

Vegetation maintenance at Long Pine Key campground and along the campground access road, as well as maintenance and along Main Park Road, Pineland Trail Parking Area and Research Road occurs within or immediately adjacent to designated critical habitat for this species. The maintained lawn areas do not include any PCE and are considered excluded, by text, from the critical habitat designation. Side trimming of the tree line is likely to result in localized and short-term impacts to the pine rockland habitat PCE.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Bartram's scrub hairstreak butterfly and its critical habitat:

- Staff performing the vegetation maintenance program will be informed of the potential presence of federally endangered butterflies in the area and to avoid directly impacting any butterflies if seen while conducting maintenance.
- Annual surveys of known locations of host plants adjacent to developed areas will be carried out.
- Casting of cut vegetation or discharge of large clippings into undisturbed habitats adjacent to the trail area being maintained in areas occupied by pineland croton will not be permitted.

In summary of this information and considering the conservation measures for the Bartram's scrub hairstreak butterfly, the Service believes that effects to the species will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Bartram's scrub hairstreak butterfly and Bartram's scrub hairstreak butterfly critical habitat.

Effects of the action on the Florida leafwing butterfly and Florida leafwing butterfly designated critical habitat

The Florida leafwing butterfly (*Anaea troglodyte floridalis*) is a federally endangered, medium-sized butterfly that is found in pine rockland and marl prairie habitats which support its host

plant, the pineland croton (*Croton linearis*). Adult butterflies have also been observed within rockland hammocks. The latter habitat may serve as a roosting site or source of food. Adults may feed on sap, rotting fruit, and animal dung. Currently, this species is believed to only occur in the Long Pine Key area in the Pine Island District. All other populations outside of ENP are considered extirpated. Adults and larvae of Florida leafwing have been observed by NPS staff over the past 15 years in suitable habitat throughout the Long Pine Key area. Pine rockland with pineland croton occurs in isolated patches along limited portions of Research Road and Main Park Road. No observations of this species have been made in pine rocklands within ENP east of Long Pine Key (e.g. Pine Island and Parachute Key) and the host plant is present in very limited areas away from development. Monitoring data indicates that populations of Florida leafwing fluctuate irregularly throughout the year and both adults and larvae can be present during any season. At times, individuals are difficult to detect, and this indicates that their overall numbers may be quite low. During these low points, populations may be especially vulnerable to disturbance or impacts to host plant populations. Currently there are no specific times of year that are known to be greater or less likely to result in impacts to individuals.

No known occurrences of pineland croton are found in areas to be mowed and maintained. Therefore, no direct impacts to Florida leafwing butterfly immature life stages (i.e., eggs and larvae) are anticipated to occur as a result of the action. Potential impacts from the action would likely be limited to disturbance of adult individuals visiting the maintained areas during mowing and trimming activities to nectar on flowers. Such butterflies would likely vacate the area during maintenance activities until the disturbance has completed. This level of harassment is unlikely to result in harm (injury or death) to individuals.

Vegetation maintenance at Long Pine Key campground and along the campground access road, as well as maintenance along Main Park Road, Pineland Trail Parking Area and Research Road occurs within or immediately adjacent to critical habitat for this species. The maintained lawn areas do not include any PCE and are considered excluded by text from the critical habitat. Side trimming of the tree line, which is not excluded by text from the critical habitat, is likely to result in localized and short-term impacts to the pine rockland habitat PCE.

The following conservation measures have been incorporated into the proposed action in order to minimize effects to the Florida leafwing butterfly and its critical habitat:

- Staff performing the vegetation maintenance program will be informed of the potential presence of federally endangered butterflies in the area and to avoid directly impacting any butterflies if seen while conducting maintenance.
- Annual surveys of known locations of host plants adjacent to developed areas will be carried out.
- Casting of cut vegetation or discharge of large clippings into undisturbed habitats adjacent to the trail area being maintained in areas occupied by pineland croton will not be permitted.

In summary of this information and considering the conservation measures for the Florida leafwing butterfly, the Service believes that effects to the species will be insignificant and

discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Florida leafwing butterfly and Florida leafwing butterfly critical habitat.

PLANTS

Effects of the action on the Cape Sable thoroughwort designated critical habitat

Cape Sable thoroughwort was federally listed as an endangered species in 2014. The NPS determined the proposed action would have "no effect" on the Cape Sable thoroughwort based on the known distribution and habitats occupied by this species within ENP. Critical habitat for Cape Sable thoroughwort has been designated and includes the majority of coastal hardwood hammocks, buttonwood hammocks, and associated higher elevation plant communities within the Flamingo District of ENP.

Side trimming of native vegetation within designated critical habitat along Main Park Road, the access road to the Flamingo Maintenance Yard, and adjacent to designated critical habitat along Bear Lake Road may result in impacts to PCE #1 - Areas of upland habitats consisting of coastal berm, coastal rock barren, coastal hardwood hammock, rockland hammocks, and buttonwood forest (Service 2014), including coastal hardwood hammock. These impacts would be expected to occur in the currently maintained areas where vegetation maintenance activities routinely occur. All activities associated with the vegetation maintenance would occur within previously disturbed and/or altered lands within ENP. However, hardwood hammock species, a component of a PCE #1, may encroach into the maintained area. Therefore, it is anticipated that the vegetation maintenance activities at the locations described herein, within designated critical habitat in the Flamingo District of ENP, may impact the hardwood hammock (PCE #1) within critical habitat for Cape Sable thoroughwort. These impacts will be very limited in scope and scale.

Trimming of native vegetation along trail sections within designated Cape Sable thoroughwort critical habitat would result in limited direct impacts to PCE #1 - Areas of upland habitats consisting of coastal berm, coastal rock barren, coastal hardwood hammock, rockland hammocks, and buttonwood forest (Service 2014) for the species. Impacts to critical habitat from both cutting of vegetation and casting of cut vegetation off trail are expected to occur. These impacts are expected to be very localized and limited to areas where disturbance from well-established trails has occurred for many decades. Failure to maintain trails that are open to the public typically leads to the formation of social trails in areas where limbs or tree falls block portions of the trail. In these areas, impacts from the creation of social trails would likely be similar to the impacts that arise from trail clearing itself.

In summary of this information, the Service believes that effects to Cape Sable thoroughwort critical habitat will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the Cape Sable thoroughwort critical habitat.

Effects of the action on the Florida bristle fern proposed critical habitat

Florida bristle fern (*Trichomanes punctatum* ssp. *floridanum*) is a federally endangered plant. In ENP, the bristle fern had been historically reported around the Royal Palm Hammock area; however, this plant was last observed in ENP in the early 1900's. Surveys have been carried out at Royal Palm Hammock on numerous occasions between 2004 and the present and this species has not been observed. ENP considers this species to be extirpated from ENP's flora and determined the proposed action would have "no effect" to the species.

A proposed rule for designated critical habitat for this species was recently published in the Federal Register (FWS 2020). In accordance with section 7(a)(4) of the ESA, ENP addressed the action's potential effects to proposed Florida bristle fern critical habitat in the form of a conference.

The proposed rule included Royal Palm Hammock within the boundary of critical habitat but excluded by text developed areas within the boundaries of the critical habitat. The majority of Royal Palm Hammock where vegetation management would occur is previously developed and considered to be excluded from the critical habitat by text because it lacks PCEs identified in the proposed rule. The Royal Palm developed areas are immediately adjacent to rockland hammock habitat, and side trimming of vegetation to prevent growth into the developed and maintained area may occur.

The following conservation measure has been incorporated into the proposed action in order to minimize effects to Florida bristle fern proposed critical habitat:

- Casting of cut vegetation or discharge of large clippings into undisturbed rockland hammock habitat at Royal Palm Hammock within proposed critical habitat for Florida bristle fern will not be authorized.

In summary of this information, the Service believes that effects to proposed Florida bristle fern critical habitat will be insignificant and discountable. Therefore, the Service concurs with the NPS's *may affect, and is not likely to adversely affect* determination for the proposed Florida bristle fern critical habitat. If the proposed rule to list Florida bristle fern critical habitat becomes finalized, this Conference Concurrence can then be adapted as a Concurrence Letter for Florida bristle fern critical habitat.

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